BUSINESS GEOGRAPHY

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BUSINESS GEOGRAPHY

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PREFACE

Modern Geography has become a definite science. Its principles are so well defined that a knowledge of the physical conditions under which a race has lived and now lives gives a reasonably reliable indication as to the capacity, activity, occupations, and business relations of that race. In studying this growing science the first step is to understand the main principles. That is the reason for Part I of this book. A second step is to apply the principles to concrete problems as is done in Part II. There the community engaged in a particular line of activity is taken as the unit in order that the geographical relationships may first be studied in relatively simple forms before going on to the more complex regional studies of Parts III and IV. In the regional chapters the aim is to give a clear conception of the way in which geographic conditions influence the products of a region, the capacity of the people, the direction in which their activities are turned, and the nature and extent of their business relations with other regions.

The present book stands in an intermediate position between two books by Huntington and Cushing, namely *Commercial and Industrial Geography* (World Book Company), and *Principles of Human Geography* (John Wiley & Sons, Inc.). Although each is complete in itself and occupies a separate field, the three books form a connected series. If the students who use *Business Geography* have not already taken a course in Commercial Geography in the seventh, eighth or ninth grade, the teacher is advised to have them use the first of the books named above and some other books such as J. R. Smith's *Commerce and Industry* (Henry Holt & Co.), for supplementary reading. If the pupils are to get a thorough grounding in the broader principles of geography in general and thereby see how business geography is related to the physical, sociological, and political phases of the subject, the teacher is advised to supplement the present book with a course based on some one of the several textbooks that especially stress physiography, and on *Principles of Human Geography*, and Bowman's *The New World* (World Book Company).

Suggestions to Teachers.—The authors of *Business Geography* are convinced that the best way to study geography is through problems for which the text gives the necessary background. They also believe that many of the problems should involve the making and interpretation of maps, and the use of statistics. Hence this book not only gives an unusual number of problems at the ends of the chapters, but contains a large and unique series of tables. These tables have been prepared with great care, many having been specially calculated in order to adapt them to map-making. Judging by the experiences of the four collaborators, a careful working out of all the problems, which means an intensive study of all the tables, will give the teacher a surprising amount of new information, and will show that many widely held ideas are not supported by the facts.

The wealth of material contained in the tables, the high demands of some of the problems on the reasoning powers, and the necessity for constant and careful comparison of map with map and table with table, adapt the book to the use of college classes. The text, however, and a large number of the simpler problems are well within the comprehension of high school students. When the book is used for high schools it will generally be found advisable to give each student only a few problems with each chapter. Often a problem can profitably be divided into several parts, each to be worked out by different students or groups of students. The results can be brought before the class for comparison and final study. Further suggestions will be found at the beginning of the tables.

Another point which the authors wish strongly to stress is the advisability of having all students, whether in college or high school, *make many maps and keep them in an orderly file for reference.* A large supply of desk maps, especially of the United States, the World (large size), and Europe, should always be on hand. Those showing relief in an inconspicuous color and having tinted oceans (as in the series of the Denoyer-Geppert Company, Chicago, Ill.), are especially desirable because the material inserted by the students is in no danger of being confused with black lines on the original map, and the relations of all sorts of products and activities to relief and the oceans are apparent at a glance.

The authors are deeply impressed with the value of using the home town, the home state, and the United States as points of departure for the study of more distant regions. In almost every problem, whether the matter is specifically mentioned or not, the student should compare his own region with others that depart from it in varying degrees. Moreover, in comparing the business activities of one region with those of another, the teacher should never let the student lose sight of the fundamental importance of the main geographic factors—position, relief, water bodies, soil, minerals, climate, plants and animals. If the relation of these to business at home is clearly understood, there will be little difficulty in understanding similar relations elsewhere.

The treatment of Canada presents a somewhat difficult problem. To all intents and purposes the well-inhabited part of that country is merely a northern extension of the United States. It has been treated as such in the present volume, but is inevitably overshadowed by the United States. If further study of Canada is desired the teacher is advised to use the text and especially the tables of Colby's *Source Book of North American Geography* (Chicago University Press), and to modify the exercises for the United States so that they apply to Canada. If this is done, *Business Geography* will serve for Canadian students as well as for those of the United States.

Throughout the book it has in many cases been necessary to use figures pertaining to the period before the War. Such figures often represent the normal conditions more accurately than do any available for later years. For this reason a number of maps are drawn with the old European boundaries instead of the new.

In conclusion the authors wish to thank Professors A. N. Bateman, L. P. Breckenridge, A. Knopf, C. J. Tilden, and H. N. Whitford, all of Yale University, who have read sections of the manuscript or proof of this book and made many valuable suggestions. Professor S. S. Visher of Indiana University has also read the whole of the proof, and his valuable suggestions call for most grateful recognition. Mr. O. E. Baker of the U. S. Department of Agriculture is still another to whom warm thanks are due for his kindness in furnishing data, especially on the use of the land. Other government officials, especially in the Census Bureau, the U. S. Geological Survey, and the Department of Agriculture, have shown unfailing courtesy and good judgment in supplying data not otherwise accessible. Similar courtesy has been received from various sources in the matter of photographs, all of which are acknowledged in connection with the illustrations.

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BUSINESS GEOGRAPHY

PART I

GEOGRAPHICAL PRINCIPLES IN BUSINESS

CHAPTER I

THE NATURE OF BUSINESS GEOGRAPHY

What Business Includes.—Business may be defined as the exchange of one product for another, or the preparation of products for such an exchange. The merchant, the importer, and the manufacturer are typical business men. So, too, is the banker, for he deals with money which is merely a convenient way of representing goods which one man transfers to another. The ordinary farmer is not strictly a business man, but he engages in many business transactions such as buying tools, fertilizer, and seed, and making bargains for the sale of his products. The manager of a plantation, however, or of a large farm, engages so frequently in buying and selling that he is as much a business man as the head of a large store. Many other people, although employed in other occupations, are deeply concerned in business. This is true of the laborer, for example, even though he owns neither land, buildings, nor tools. If the products upon which he works find a ready sale he is relatively sure of his job, but if they are not salable he may lose it or have to work part time. Like everyone else, whether he is working or idle, he must have food, clothing, and shelter, and the business of getting them is highly important. Among all sorts of people the wife or mother generally buys food and clothing as well as many other necessities, so that she, too, takes an active part in business. Thus practically every adult is interested in business in a very real and vital way.

An Example of Business Geography.—A simple example of what actually occurred in a pioneer Minnesota village will show how a survey of geographical conditions helps a man in business. A few years ago a young man started a general store in spite of the protests of his friends. They thought he would fail because another store already handled the small business of the community. He looked over the geographical conditions, however, and went to work.

Here are the conditions: The country for miles around the village was a level plain; the soil was deep and fertile; the climate fairly cool and invigorating, too cool for corn but excellent for potatoes, grass, and cattle-raising. The plain was covered with a mixed forest of pine and hard wood except around a lumber camp where the trees had been cut for a steam mill near the village. In isolated clearings a handful of farmers had settled, and were pasturing cattle on a fine growth of short sweet grass in the cleared areas not needed for crops. Transportation was difficult. Through the village, to be sure, ran a railroad, but there were no good roads, nothing but lumber trails and cart paths. One other feature completes the geographical picture, namely, a number of pretty glacial lakes full of fish and surrounded by woods where game was still abundant. If the young man had put his thoughts into the language of commercial geography he would have said that his problem centered around four communities: (1) a lumber mill with its shifting, irresponsible population; (2) a few farmers; (3) a tiny commercial village near a railroad station; and (4) occasional campers on the shores of the lakes.

The proprietor of the old store was content to carry chiefly the staple goods such as bacon, sugar, flour, and clothing. The rough clothing and especially the heavy boots and shoes used by the men in the mill formed a large part of his sales. The proprietor of the new store realized that he must cater somewhat to the millmen, but he knew that the geographical conditions would some day produce a farming community. All the lumber would be cut, the mill would shut down, and the cleared land would be taken over by farmers. The farmers were indeed poor; they could purchase little, and had only a small surplus to offer for the market. Even that little they had much difficulty in bringing to the railroad because of the bad roads. They were reliable, however, because their homes were permanent, and the storekeeper could safely give them credit. On the other hand, the workers in the mill had cash and were good spenders; but they were likely to quit their jobs and leave their bills unpaid.

So the new storekeeper began a campaign to help the farmers and thereby help himself. He urged the county commissioners to open new roads and improve the old; he handled the farmers' surplus and paid for it in goods from the store—an exchange in which both profited. He showed the farmers that by using cream separators (sold by himself) they could market their cream and wisely increase their herds of cattle in a region where pasture was going to waste. He procured the cooperative purchase of a stump puller, and clinched his argument for tractors by pointing out that they are not affected by annoying horse flies which are particularly vicious among the forests. He improved his stock of groceries and general merchandise and at the same time made his patrons desire better things; he even sold ready-made dresses to the farmers' wives. He reached out also to another community, small but well able to pay, that is, the campers who came to hunt and fish. He attracted them by his prompt and accurate information, and by providing guides and outfits. In short, by hard, honest work along the lines dictated by geography he completely outstripped his competitor.

Factors of Business Geography.—This example of business geography is so simple that all its relationships are obvious at once. It includes the following factors: (1) the *products* of a community; that is, the lumber of the forest and the surplus milk and vegetables of the farmers; (2) the *needs* of the community, or the supplies that they want or can be made to desire; (3) the conditions of *transportation* as determined by the roads; and (4) the *character* of the people; that is, their habits, their tastes in goods or services, and their honesty and ability. Every business problem involves these four factors. It may include hundreds of millions of people and billions of dollars; it may involve several governments; and its study may demand the work of experts for years. Yet its geographical relations can be understood if the facts are known and are interpreted in the light of the four great factors: products, needs, transportation, and human character.

In general these four factors are governed by laws or principles whose nature is fairly well known. Thus the reasons why the products of some regions are varied, abundant, and of high quality, while those of others are few in number, small in quantity, and poor in quality are illustrated in the table on the next page.

People's needs depend largely on the same conditions as their products. Human conditions, however, are especially important in this respect. Thus all tropical people demand less clothing than those of cold countries, but those who are in a low stage of civilization require little beyond a loin cloth, while those who are highly civilized want many different styles of clothing including such articles as pith helmets,

Production depends on
- A. Physical conditions
  1. Climate discussed in Chaps. II and VI.
  2. Relief, Chaps. III and VIII.
  3. Minerals, Chaps. III and IX.
  4. Soil, Chap. IV.
  5. Position, especially with reference to bodies of water, Chap. VIII.
- B. Animals and plants, Chaps. II, III and IV.
- C. Human conditions
  1. Race, Chap. V.
  2. Health and energy, Chap. VI.
  3. Government, Chap. VII.
  4. Stage of civilization, habits, etc., Chap. VII.

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veils, and gloves to protect them from sunburn or mosquitoes. The needs of a people may be classified as follows:

1. Food.
2. Clothing.
3. Shelter.
4. Tools, implements, machinery.
5. Transportation.
6. Recreation.
7. Requirements of government both in peace and war.
8. Higher needs including religion, art, education and science.

In some form or other these needs are felt by practically everyone. The business of the world arises because they must be satisfied. The degree of activity with which they are satisfied, as is explained in Chapter VII, depends largely on the following factors:

1. Distance from source of one product to source of another.
2. Transportation.
3. Diversity, quantity, and quality of products.
4. Density of population.
5. Racial character.
6. Health and energy.
7. Government.
8. Language and customs.
9. Historic development and degree of progress.

Types of Business Communities.—The ways in which people satisfy their own needs or produce something to exchange for the products of others differ greatly. This gives rise to different occupations, and thus to different kinds of communities. A community is a group of people who live relatively near together and are bound together by the nature of their daily work. Some of the chief types of communities are described in Chapters X to XVI. Those there considered and a few others may be classified as follows:

A. Communities dependent upon animals
   1. Primitive hunters.
   2. Nomadic raisers of cattle, sheep, and camels
   3. Ranchers.
   4. Dairymen.
   5. Fishermen.

B. Communities dependent on agriculture
   1. Primitive tropical farmers.
   2. Tropical and sub-tropical rice raisers.
   3. Farmers of the one-crop type who carry on what is known as *extensive* farming.
   4. Horticulturists, including truck farmers, fruit raisers, and others who carry on highly *intensive* cultivation of the soil by hand.
   5. All-around general farmers who cultivate the soil with moderate intensity with the help of animals.

C. Lumbering communities.
D. Mining communities.
E. Manufacturing communities.
F. Commercial communities.
G. Governmental, educational, religious, and scientific communities composed of people who deal chiefly with ideas rather than with material products.
H. Recreational communities.

Every inhabited region, large or small, contains one or more kinds of communities, and a good way to understand its business is to see what types of communities it contains. Hence in the last half of this book, Chapters XVII–XXX, we shall examine the continents and the United States to see how the various types of communities are distributed, how they produce the materials of commerce, and how they exchange them for other things in order to satisfy their needs. We shall find that in many cases different kinds of communities are located close together, and often form part of a single city.

CHAPTER II

THE WORLD'S GREAT PRODUCTS AND THEIR CLIMATIC OPTIMA

Every legitimate business transaction aims to change the position or condition of some product so that the product becomes more desirable and hence more valuable. In order to carry on such transactions intelligently the business man should know what kind of products are characteristic of the regions with which he deals, how abundant they are, and of what quality. The differences in these respects are enormous. France, for example, is a small country, but it provides a great variety of products. An equal area in northern Siberia, the Sahara, or the Amazon region may supply only a few kinds of goods where France supplies a hundred. Or again, a million people located in central China or southern India may produce scarcely a tenth as much as a million in France, and in quality their products are much inferior to the corresponding French goods. In this chapter and others an attempt is made to explain such differences.

The Five Great Classes of Products.—There are many ways of classifying the products that enter into commerce and industry, or into business as we may equally well say. The most common is (1) foodstuffs, (2) raw materials, and (3) manufactured goods. This is good as far as it goes, but raw materials consist of at least three types so distinct that they ought to be considered separately. These are (A) non-metallic raw materials, (B) fuels, and (C) metallic raw materials, or metals. Hence in this book we shall frequently refer to five classes of products, namely, (1) foodstuffs, (2) non-metallic raw materials which will sometimes be called simply raw materials, (3) fuels, (4) metals, and (5) manufactured goods. Foodstuffs are usually the most important. In a well-regulated family of moderate means in the United States from 20 to 40 per cent of the total expenditure is for food, the figure rising among poor people and falling among the well-to-do. In less advanced countries like Egypt this figure rises to perhaps 75; in other words, three-fourths of the work of the inhabitants is devoted to getting enough to eat. Naturally then, the business connected with foodstuffs is commonly of the first importance.

Among the many non-metallic raw materials the chief are the fibers, such as cotton and wool from which clothing is made, and building materials, such as wood, clay, and stone. The ordinary family spends from 10 to 20 per cent of its income on clothing, and about 25 per cent on rent, or shelter, although recently this figure has risen higher. Hence the materials used for these purposes stand second only to food in importance.

The fuels and the sources of power include not only coal, oil, and minor fuels, but water and wind. We might also add horses and other draft animals, for these supply power just as does the coal in an engine. The metals, the fourth great class of products, differ from such non-metallic raw materials as building stone and clay because as a rule they must be considerably changed by smelting before they can be used. They are primarily the material of tools and machines.

Finally, manufactured goods form the fifth great class of products. In one sense almost everything that enters into commerce is at least very slightly manufactured, for the wheat has been threshed, the wood sawed, and the coal broken into usable sizes before it is sold. Manufacturing, however, usually means that a raw material is changed so much that its form and use are distinctly different from what they were in a state of nature. Food, to a large extent, comes to the ultimate consumer either unmanufactured, or only slightly manufactured, as in the case of flour which is merely ground. The materials for clothing, machinery, and even shelter, on the other hand, are usually of little use to the final consumer until altered by manufacture. Many articles, indeed, such as lighting fixtures, fine dress goods, and clocks, are so greatly altered in manufacturing that they show little connection with any kind of raw material.

Food, raw materials, fuels, metals, and manufactured goods form a series of increasingly complex products. The simplest savages and even the animals use food. When primitive man began to fashion raw materials into shelter and clothing he took one of the first great steps toward civilization. When he found out how to make fire and thus began to use fuel he took another. Next he used his fire to smelt metals which led the way to the making of good tools and machines. The last stage was to use the tools and machines for the complex processes of modern manufacturing. The business of the world consists largely of the interchange of these five types of products between people of different regions, different occupations, or different stages of development.

The Conditions that Govern Production.—The kind, quantity, and quality of the products of a region depend partly on nature and partly on man, as appears in the following tabular view:

Factors in production
- Nature
  - 1. Climate
  - 2. Relief
  - 3. Minerals
  - 4. Soil
  - 5. Position
- Man
  - 6. Racial character
  - 7. Energy
  - 8. Training and civilization

The five natural factors explain themselves. Among the three human factors, racial character includes not only the inherited abilities of the rank and file, but the proportion of men of genius; energy is a matter of health and inheritance while training depends on social environment, including education, government, religion, and historical development. No one factor works alone, for the production of a region is generally the result of a combination of all eight. Although each factor can most easily be studied separately, its effect is greatly modified and often neutralized by that of others. For example, climate has far more effect than any other physical condition upon the production of plants and animals; but the character of the people who live in a place like Hawaii may cause the products to differ from those found in similar climates elsewhere.

Climatic Optima as a Primary Factor in the Production of Food and Animals.—Everyone knows that plants and animals vary according to climate. Corn thrives in the sunny showery summers of Iowa, but not in the equally moist but cooler summers of Scotland. Palms and pines thrive best under such widely different conditions that their presence together is a theme for the poets. The two-humped Bactrian camel is extraordinarily well adapted to the dry desert and can stand the most intense cold. But in snow or mud the great brute sometimes slips until it falls on its stomach with its legs stretched out in front and behind, thus breaking a tendon so that it has to be killed. When the nomads of Central Asia graze their camels among the moist mountains they protect them from the drizzling rain with huge woolen blankets, for otherwise the beasts would be chilled and die, even in summer.

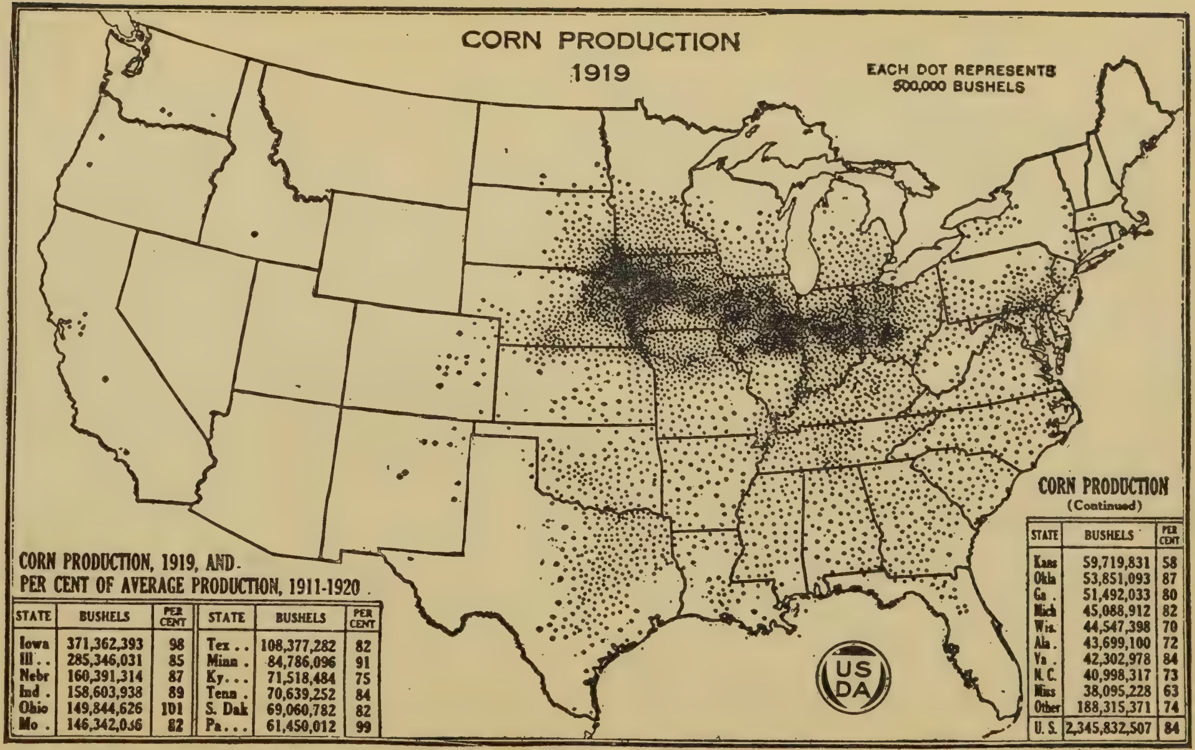
The Optimum for Corn.—Every plant and animal has what is called an optimum climate, that is, a certain temperature, humidity, variability, and degree of sunshine under which it thrives best. The area of greatest production of corn in the U. S. has an average summer temperature of about 75°, which may be considered not far below the optimum temperature of greatest growth. Corn needs not only a high summer temperature, but requires about 140 days without frost. Such conditions are found where the temperature of the germinating and ripening seasons averages approximately 55° or 60°. The optimum rainfall is enough to keep the ground moist though not waterlogged during rapid growth, but less when the full-grown ears are ripening. The average rainfall in the corn belt during the critical period of July when the ears are developing is about 4 inches. A moderate increase raises the production, but a great increase does not produce a corresponding effect. On the other hand, a slight decrease below 4 inches decreases the corn crop. Thus the optimum July rainfall appears to be more than 4 inches but less than 8. This abundant rainfall must not be accompanied by great cloudiness, for that stunts and rots the corn. Hence the optimum is warm sunny weather interspersed with frequent showers. A close approach to these optimum conditions causes eastern Nebraska, Iowa, Illinois, and Indiana to be the great corn region of the world. Certain tropical regions may approach the optimum still more closely, although their present yield per acre is less than in the United States because of poor cultivation.

The fineness of the soil, the levelness of the plain, and the skill of the farmer also have much to do with the abundance of the crops, but they are not the main factors. This appears from the fact that although Manitoba and eastern Colorado rival the corn states in soil, in levelness, and in the skill of the farmers, they produce little corn. Manitoba is too cool, Colorado too dry. This can be seen in Fig. 1, where dotted lines indicate an average temperature of 66° F. and a total rainfall of 8 inches for the three summer months of June, July and August. South of the temperature line the climate is sufficiently warm so that corn flourishes. East of the rainfall line there is moisture enough. North and west of the lines, because of low temperature and light rainfall, corn grows only in very small quantities.

The climatic optima for corn help to explain why the Ohio farmers are so prosperous; why Iowa raises over 40 hogs per farm and Wyoming only 8; why corn cakes are the great bread-food of Mexico, and why Hungary is the chief corn country of Europe.*

The Optimum for Horses.—The climatic optima of animals are not so evident and have not been studied so carefully as those of plants, but they are just as real and important. We have already seen how the camel usually loses his value when taken into a climate where rain or snow is common. In the same way the horse does not thrive everywhere. When a horse is brought from Texas to Boston, for example, he is often somewhat sickly at first and has to be acclimated. But neither Texas nor Boston has the kind of climate most favorable to horses. In the wild state the horse thrives best in a climate too dry

* For a good discussion of the optima for corn and other crops, see J. Warren Smith's *Agricultural Meteorology*, 1920.



CORN PRODUCTION, 1919, AND PER CENT OF AVERAGE PRODUCTION, 1911-1920

STATE	BUSHELS	PER CENT	STATE	BUSHELS	PER CENT
Iowa	371,362,393	98	Tex . .	108,377,282	82
Ill. .	285,346,031	85	Minn .	84,786,096	91
Nebr	160,391,314	87	Ky. . .	71,518,484	75
Ind .	158,603,938	89	Tenn .	70,639,252	84
Ohio	149,844,626	101	S. Dak	69,060,782	82
Mo .	146,342,036	82	Pa. . .	61,450,012	99

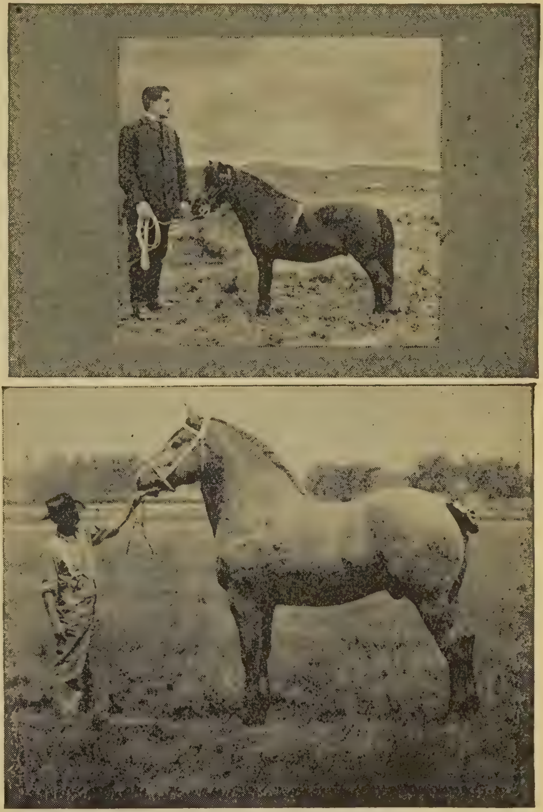
CORN PRODUCTION (Continued)

STATE	BUSHELS	PER CENT
Kans	59,719,831	58
Okla	53,851,093	87
Ga .	51,492,033	80
Mich	45,088,912	82
Wis.	44,547,398	70
Ala .	43,699,100	72
Va .	42,302,978	84
N. C.	40,998,317	73
Miss	38,095,228	63
Other	188,315,371	74
U. S.	2,345,832,507	84

Courtesy of U. S. Department of Agriculture.

FIG. 1.—Distribution of Corn in the United States, 1919.

for forests, but moist enough for abundant grass. In winter the snow must not be so deep that the horse cannot paw through it to the grass. This illustrates the highly important fact that for wild animals and also for primitive man the best climate is one that furnishes a proper food supply as well as one that has a good effect directly upon health.



Courtesy, U. S. Bureau of Animal Husbandry.

FIG. 2.—A Percheron Horse Compared with a Shetland Pony.

One of these breeds of horses originated where climatic conditions are almost ideal; the other where the climate is too moist and cool.

The domestic horse can thrive in regions that are naturally forested, for man sees to it that there is plenty of grass. Hence, the horse thrives best where the summer pasture and the winter hay are especially nutritious, and where the temperature is moderate. Where great heat is coupled with humidity, the horse, unlike his relative the mule, suffers from something which seems similar to sunstroke in man. Again, the ordinary horse, unlike the shaggy Shetland pony and the Mongolian horse, cannot stand extreme cold and blizzards. Hence, in a good horse-raising region the temperature must not average much over 70° F. in the warmest month unless the air is dry, in which case an average of 80° or more is not prohibitive, as is seen in Arabia. In winter, the temperature ought not to average much below 40° and there should not be severe storms. The climate of England and northern France puts these places among the best in the world for horses. That is one reason why the Percheron, the English racer, and the Clydesdale are famous. The more the climate of a region departs from that of northern France, for example, the poorer the physique of the horses or else the greater the effort and expense involved in raising them. Therefore, the man who would deal in horses needs to study the climate of his chosen region most carefully in order to see whether its departures from the optimum are more than balanced by other advantages such as nearness to a good market, efficiency of labor, or cheapness of land.

Optima of the World's Chief Products.—Since every plant and animal has its optimum, a knowledge of these optima is a wonderful help in estimating the probable abundance and quality of the products of a region. It enables one to judge whether the production of a given food or raw material can be stimulated or started. It shows the exporter whether the products which he sends to a region are likely to be produced there or in neighboring regions if rivals enter the field. In fact a knowledge of the climatic optima often enables an intelligent person, who has never seen a place, to judge of its value for a business enterprise almost as well as can the more ignorant man who has lived there many years. Of course many crops and animals can be profitably raised where the climate departs widely from their optima. For example, sugar and oats are raised in Louisiana, where the climate is decidedly cooler than the optimum for sugar cane and warmer and moister than the optimum for oats. It pays to raise these products because of the United States tariff, the cost of transportation, and the poor quality of the labor supply in places which compete with Louisiana. Nevertheless, when a plant is raised in a climate much different from the optimum, the crop suffers in quantity or quality, or else extra work is required in the way of cultivation and fertilization.

How much climatic conditions have to do with the world's business may be judged by comparing the values of the chief products derived from plants and animals, and those derived from minerals. The location where each of the plants and animals is raised depends largely upon its climatic optima. The world's chief products with the estimated value of the new materials produced each year are shown in the table on page 14. Where the values for the world as a whole are shown in parentheses they are only rough estimates, for no statistics are available in many countries. For some products such as millet and wood even an approximate estimate of the annual value is impossible. Accordingly they have merely been given places that indicate their probable importance. The same is true of water as a source of power, but that material should certainly be included. Even where the figures are most reliable, as for wheat, certain parts of the earth have to be estimated. Because of the great variations in prices since the beginning of the Great War the general rule has been to take the average value of the annual production for the years 1909–1913 and add 50 per cent, but where the rate of production has increased markedly as in the case of petroleum, allowance has been made for this. The actual values of certain crops in the United States in 1921 are given in millions of dollars in parentheses in the table. Some idea of the great variations in prices may be obtained from the following figures of production on farms in the United States:

	Index No. of Annual Quantity of Crop Production.	Total Value of All Crops per Year.	Total Value of All Animal Products per Year.
1910–14	100	$5,827,000,000	$3,561,000,000
1919	108	15,423,000,000	8,361,000,000
1920	117	10,909,000,000	7,354,000,000
1921	100	7,028,000,000	5,339,000,000

In spite of the difficulty of obtaining exact figures the table on page 14 gives a good idea of the approximate value and relative importance of 50 of the chief products that are dealt with in the world's business.

The table of the world's chief products brings out many remarkable facts. For instance, an overwhelming majority of the products are derived from plants and animals. A value of nearly 60 billion dollars a year must be ascribed to food alone, even without the many minor crops not listed above. But the value of plants and animals is greater than this, for among the non-metallic raw materials most of the main items are also derived from plants and animals and minor raw materials must raise the total. Again, among the sources of power both coal and petroleum depend on the plants and animals of the past, while horses add to the importance of the present products furnished by plants and animals. Another noteworthy fact is that the total value of all the chief metals is less than that of rice, coal, or any one of 5 other products. To many people it seems rather unreasonable that the prices of all other products should be so much at the mercy of variations in the rate of production of gold which ranks only about thirty-third, if all the products are arranged in order of the value of their annual production. The plants and animals are clearly man's chief source of wealth. By the work of manufacturing, to be sure, man increases the value of nature's products by 50 per cent or more, but only in a few countries does manufacturing furnish as much wealth as do the occupations that have to do with raising plants and animals.

APPROXIMATE VALUE OF ANNUAL PRODUCTION OF WORLD'S CHIEF PRODUCTS

	World.	United States.
A. *Food Products*		
1. Rice	$8,000,000,000	$ 30,000,000
2. Wheat**	5,000,000,000	900,000,000 (737)
3. Potatoes**	5,000,000,000	350,000,000 (385)
4. Dairy products**	(5,000,000,000)	1,800,000,000 (2410)
5. Corn*	3,500,000,000	2,300,000,000 (1304)
6. Hay**	(3,500,000,000)	1,000,000,000 (1165)
7. Sheep and goats*	3,000,000,000	250,000,000
8. Millet	....	....
9. Cattle (excluding hides)*	2,500,000,000	300,000,000
10. Swine**	2,500,000,000	900,000,000
11. Poultry and eggs*	(2,500,000,000)	750,000,000 (943)
12. Oats**	2,500,000,000	750,000,000 (322)
13. Vegetables (excluding potatoes)*	....	350,000,000
14. Rye**	2,000,000,000	40,000,000
15. Sugar*	2,000,000,000	100,000,000
16. Beans*	1,500,000,000	40,000,000
17. Barley**	1,500,000,000	170,000,000 (64)
18. Sweet potatoes and yams	....	100,000,000 (87)
19. Coffee	600,000,000	....
20. Tobacco*	400,000,000	160,000,000 (224)
21. Orchard fruits (not apples)*	(400,000,000)	150,000,000 (525)
22. Apples**	(350,000,000)	160,000,000
23. Grapes*	....	50,000,000
24. Tea	300,000,000	....
25. Cottonseed	300,000,000	200,000,000
26. Peas*	300,000,000	51,000,000
27. Berries**	(200,000,000)	75,000,000
Total	$59,000,000,000*a*	$10,940,000,000
B. *Non-metallic Raw Materials*		
28. Cotton	$2,000,000,000	$1,200,000,000 (755)
29. Wood*	....	800,000,000
30. Wool*	1,500,000,000	100,000,000 (38)
31. Hides*	(1,500,000,000)	250,000,000
32. Clay products, brick, etc.*	....	200,000,000
33. Cement**	....	120,000,000
34. Rubber	400,000,000	....
35. Stone**	....	80,000,000
36. Raw silk**	300,000,000	....
37. Flaxseed*	300,000,000	25,000,000
38. Flax fiber**	250,000,000	....
Total	$10,500,000,000*a*	$2,775,000,000

APPROXIMATE VALUE OF ANNUAL PRODUCTION OF WORLD'S CHIEF PRODUCTS—*Continued*

	World.	United States.
C. *Fuels and Other Sources of Power*		
39. Coal**	$6,000,000,000	$2,400,000,000
40. Petroleum*	2,000,000,000	1,300,000,000
41. Horses, asses, mules*	1,500,000,000	400,000,000
42. Water power**	....	....
Total	$10,000,000,000*a*	$4,000,000,000*a*
D. *Metals*		
43. Iron**	$2,000,000,000	$900,000,000
44. Copper*	500,000,000	300,000,000
45. Gold	400,000,000	50,000,000
46. Lead**	150,000,000	60,000,000
47. Silver*	140,000,000	50,000,000
48. Tin	130,000,000	....
49. Zinc**	120,000,000	75,000,000
Total	$3,440,000,000	$1,435,000,000
Grand Total of Primary Production	$82,940,000,000 (90,000,000,000*b*)	$19,280,000,000 (22,000,000,000)*b*
E. *Manufactures*		
50. Value added by manufacturing	$(50,000,000,000)	$14,000,000,000

a. With allowance for missing figures.
b. With allowance for missing figures and for minor products.

NOTE. No asterisk means predominantly a product of non-cyclonic regions; one asterisk, well divided between cyclonic and non-cyclonic regions; two asterisks, predominantly a product of cyclonic regions. Rice, millet, tea, cotton-seed, cotton, and some of the metals might have one asterisk according to certain methods of estimating the cyclonic areas.

Relation of Climatic Optima to Other Factors.—A study of maps of production such as are found in Finch and Baker's *Geography of the World's Agriculture* shows that most products are raised in greatest abundance in certain well-defined centers where the climate closely approaches their optima. Nevertheless the fact that the climate is highly favorable does not necessarily mean that a given plant or animal is produced in large quantities. For example, North Carolina and the neighboring states of Virginia and South Carolina have a climate quite closely approaching that which is most favorable for silk. An appreciation of this fact has led to several determined attempts to introduce silk raising. When Virginia was settled, silk culture was actually ordered by law; it was encouraged by bounties; and its prosecution was stimulated by rhymes like this:

"Where Wormes and Food doe naturally abound,
A gallant Silken Trade must there be found.
Virginia excels the World in both—
Envie nor malice can gaine say this troth!"

In spite of this, silk culture has never succeeded in the United States. The reason is that another factor aside from climate plays the main part. That is the cost of labor. Silk culture demands a great amount of labor in order to supply leaves to the worms for the few weeks in the spring when they are growing fastest. In order to produce about 10 or 12 pounds of raw silk a ton of mulberry leaves is needed. Hence silk culture is rarely profitable where labor costs as much as in North Carolina, although it might be highly profitable if someone could invent a mechanical way of feeding the worms. Thus it appears that while climate is the chief determinant of the regions where about three-fourths of the world's great products shall be produced, allowance must also be made for other factors.

EXERCISES AND PROBLEMS*

1. What countries produce most of the world's chief products? From Tables 11, 14, and 25 in Part V, pages 433, 437, and 448 make a table of chief products and of the countries where they are produced most abundantly. Use the following model. Note that in the tables some of the figures are given in millions and some in thousands. In your table write out all numbers in full.

Product.	First Country.	Amount.	Second Country.	Amount.	Third Country.	Amount.	United States, Amount when not first, second or third.
Corn,	U. S.	22,708,300,000	Argentina	174,500,000	Hungary	168,100,000	. . .
Wheat,	U. S.	686,700,000	Russia	522,800,000	India	350,700,000	. . .
Oats,							
etc.							

In how many products does the United States stand first, second, or third? In how many does it fall below third place? Some of the products with a value of over a billion dollars in the table of the world's chief products (page 14) do not appear in your table. Explain why these are probably missing, and how the United States stands in them.

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* An unusually large number of exercises is given with this chapter. It is expected that only part will be used, perhaps a different set each year, and that part will be used in connection with Chapters X, XI, XII, and XXV. By selecting different crops or animals, or by limiting the study to one continent the same exercise can be used several times, not only in the chapters indicated above, but in Chapters XVII to XXIII on the continents. See first portion of Part V.

On a map of the world insert in each country the names of the products in which the country ranks first, second, or third, according to your table. After the name put the rank. Which of the countries in which you have placed the names of products are among the first ten countries in (*a*) area, (*b*) population? (See Table 1, page 422). Explain the reasons why the names of certain important products appear in countries which have neither a large area nor a large population.

2. In what states are the chief products mainly produced? From Tables 16, 20, 26, and 28 prepare a table of the states of the United States similar to the table for countries of the world in Exercise 1. In the last column substitute your own state for the United States. On a map of the United States insert in each state the names of the products in which it stands first, second or third. Insert the rank as in Exercise 1. Explain cases where some condition other than size and density of population causes a state to rank high in certain products. (See Table 2, page 425).

3. Discuss the rank of your own state in the production of chief products. Make a list showing its rank in each of them, and also its rank in area and population as given in Table 2, page 425. Classify the products according to whether they are produced in greater or less amounts than you would expect on the basis of (*a*) area, (*b*) population. In other words show whether the rank in production is higher or lower than in area or population. What does this show as to relative importance of the products?

4. Determine the optimum of some product from a map of its distribution. Choose one of the products in Table 16. On an outline map of the United States insert in their proper places the figures given on the columns for that product. With these figures as a guide insert symbols so that you will have a map of the chosen product like Figs. 72 (page 328), 83 (page 361), and 86 (page 367). Let the symbols and the amounts which they indicate be as follows:

For Wheat, Barley, Oats, Corn, Potatoes, and Tobacco.			For Cotton and Hay.		
Symbol No. 1	▬	40,000,000 bu.	Symbol No. 1	▬	1,000,000
2	■	20,000,000 bu.	2	■	500,000
3	▲	8,000,000 bu.	3	▲	250,000
4	○	2,000,000 or less	4	○	100,000 or less

Put the symbols in the part of each state where the product is most abundant, Save this map and all others for future use.

Describe the general distribution of your product, and especially its climatic relations. Determine as nearly as possible the following limits beyond which the production of the crop falls to small proportions or ceases: (*a*) lowest mid-summer temperature under which the crop thrives, Fig. 3; (*b*) highest mid-summer temperature, Fig. 3; (*c*) lowest annual rainfall, Fig. 5; (*d*) lowest summer rainfall, Fig. 6; (*e*) lowest winter rainfall, Fig. 7 and, (*f*) shortest growing season, Fig. 8. On the basis of these facts describe (*A*) the general climatic conditions under which the crop can grow, and (*B*) the conditions where it is raised most abundantly.

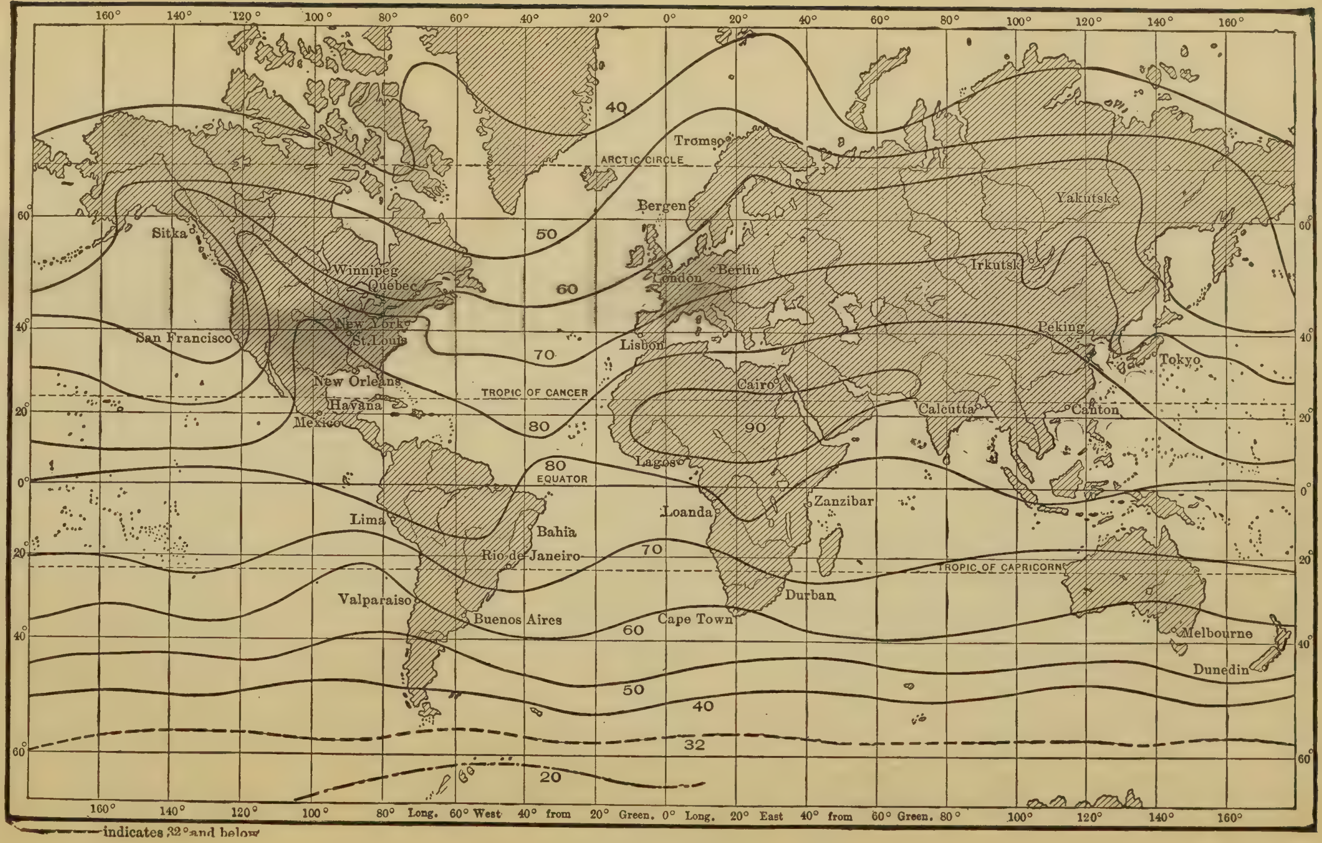


FIG. 3.—Mean Temperature of July.

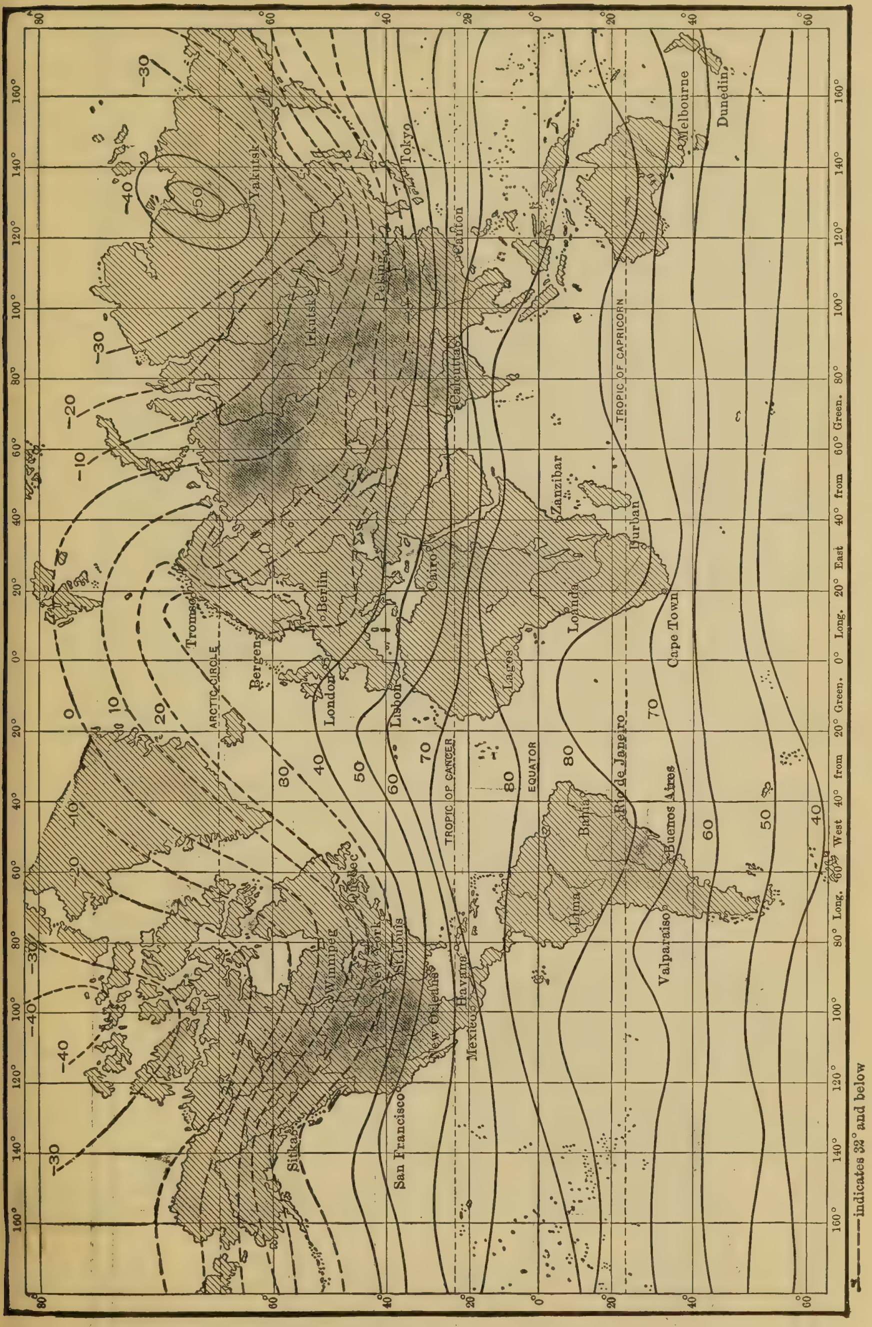


Fig. 4.—Mean Temperature of January.

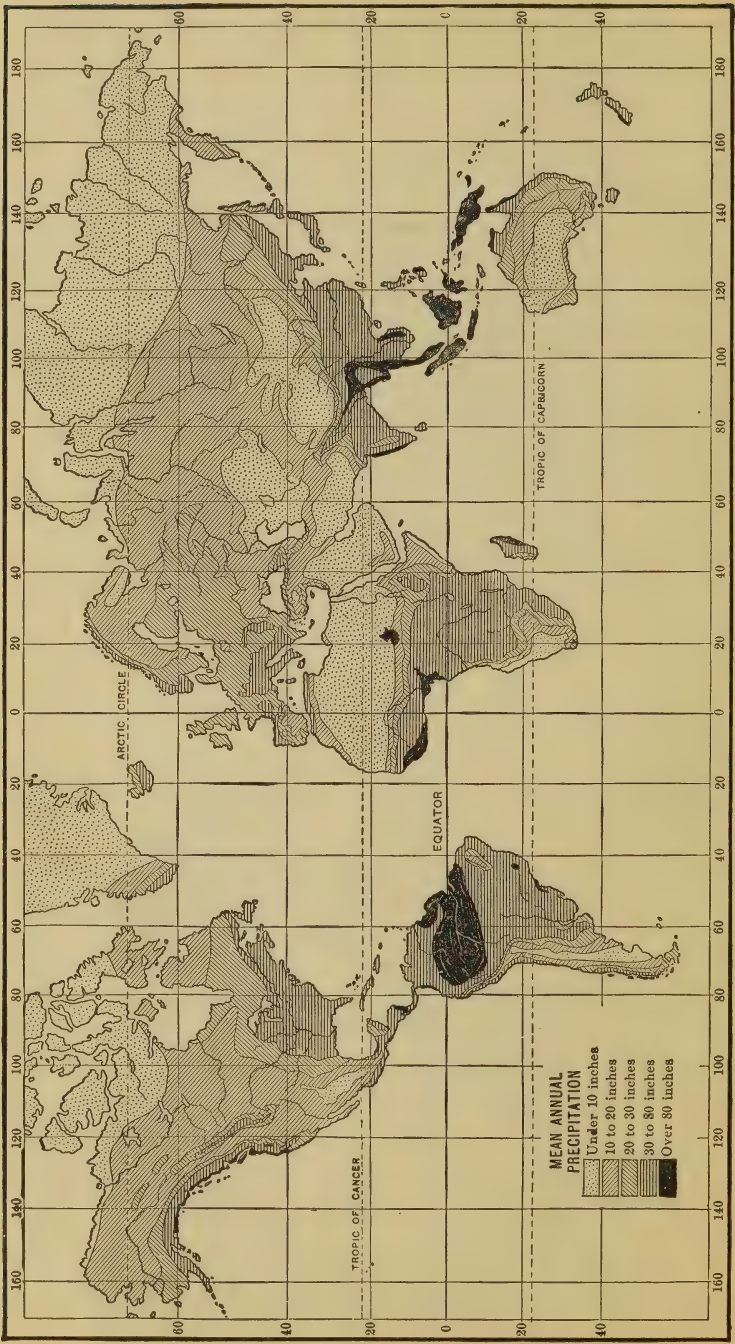


Fig. 5.—Annual Rainfall.

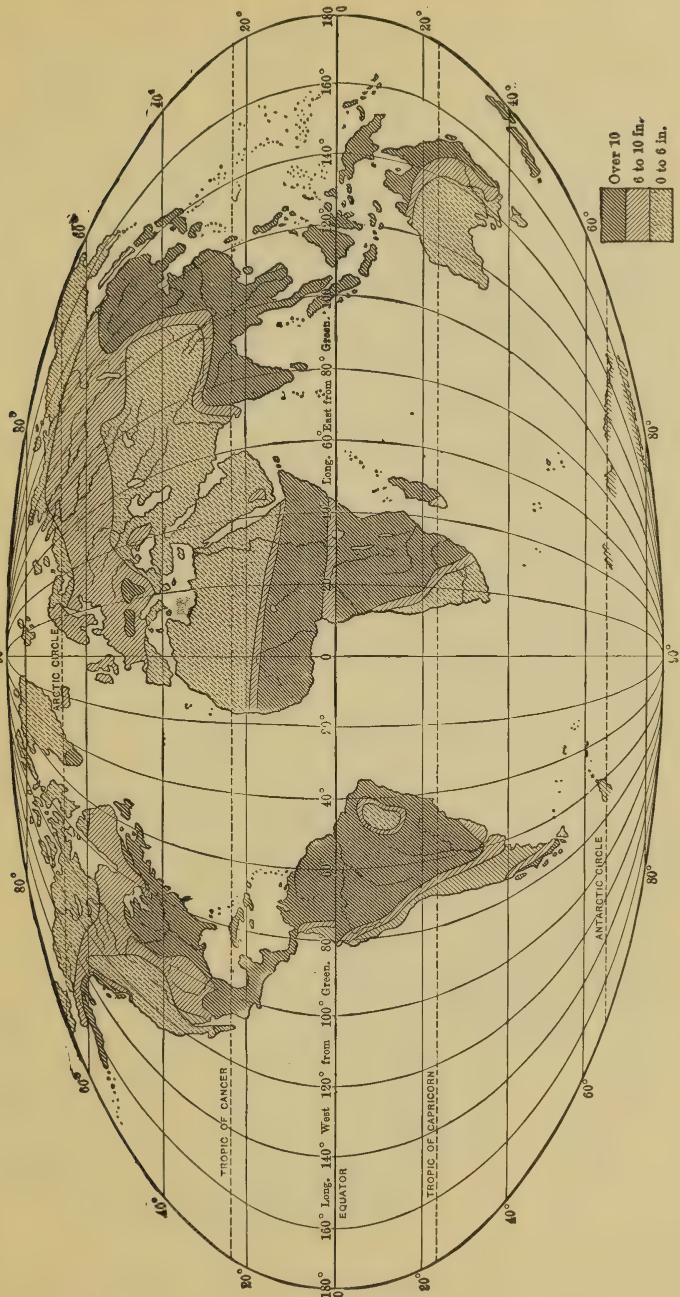


FIG. 6.—Summer Rainfall. June to August, North of Equator—December to February, South of Equator.

Adapted from *Supan*.

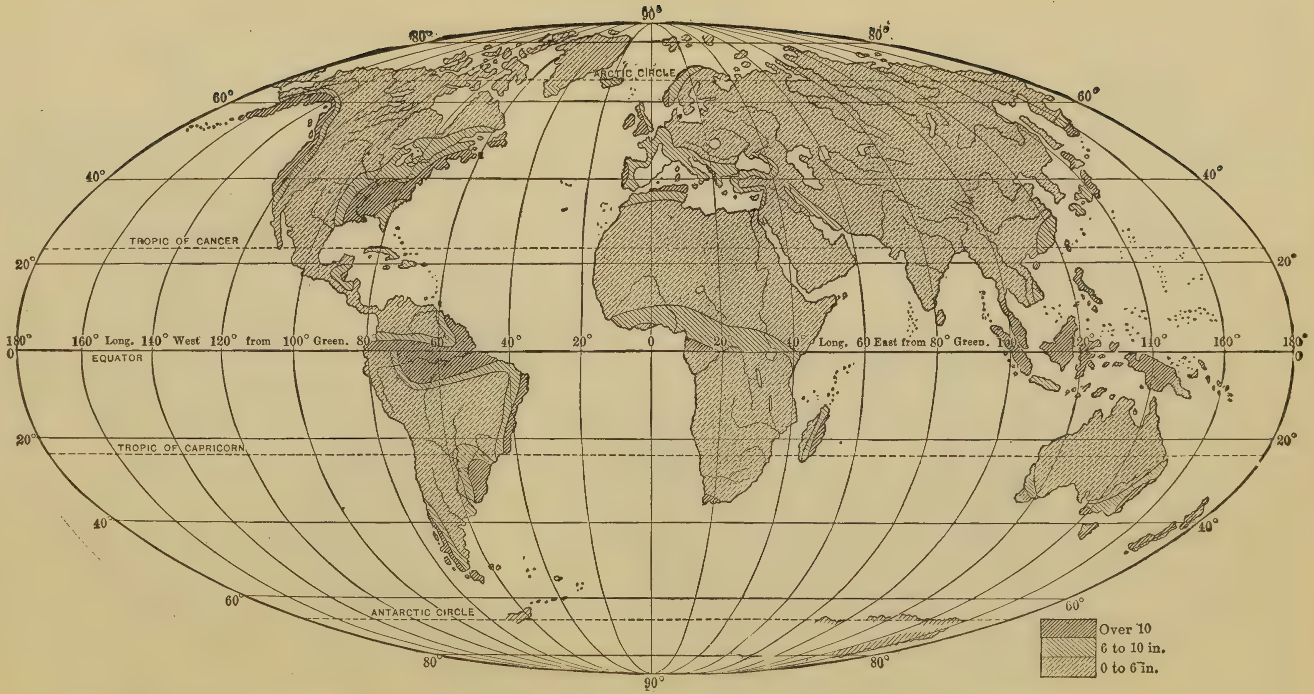
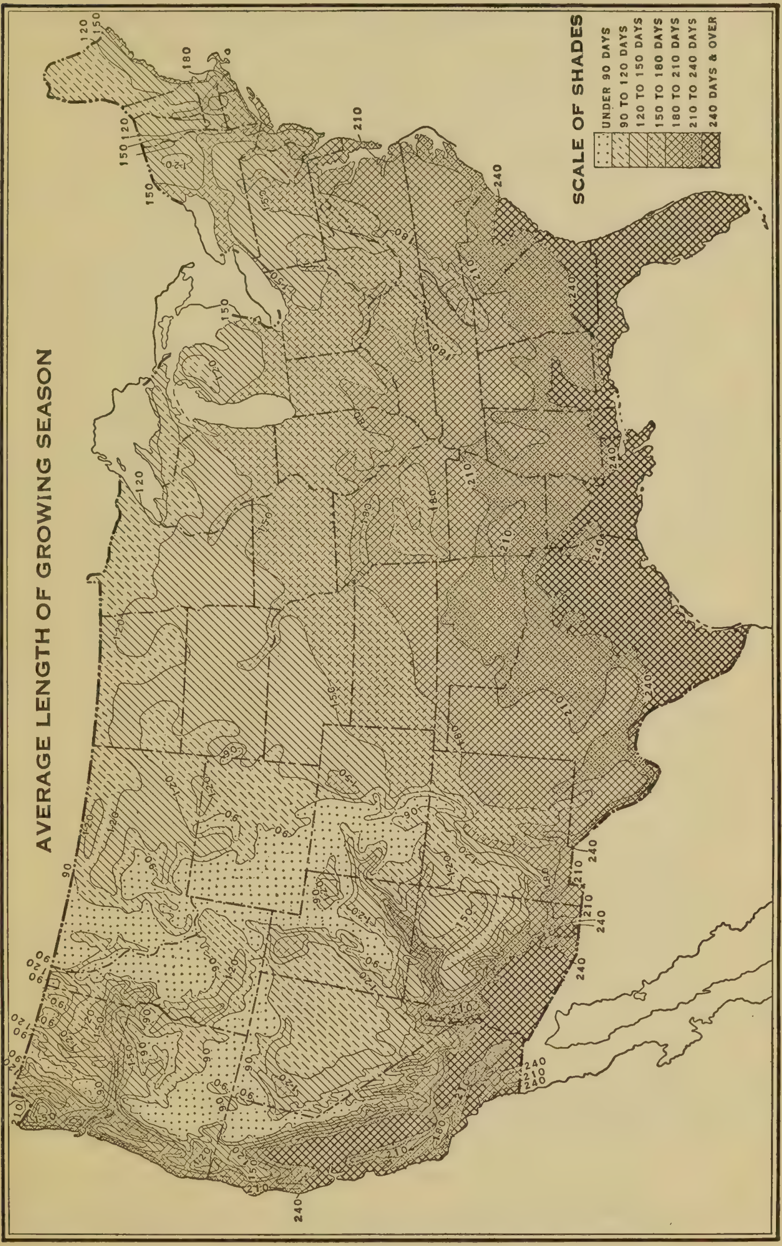


FIG. 7.—Winter Rainfall. December to February, North of Equator—June to August, South of Equator.

Adapted from *Supan*.



From Yearbook of the U. S. Department of Agriculture, 1918.

FIG. 8.—Length of Growing Season in United States.

5. Study the product of Exercise 4 by means of another kind of map. From Table 17 insert on another outline map the figures for yield per acre of the product used in Exercise 4. Use ink or indelible pencil and put the figures in the part of each state where the product is most abundant. Draw *isopleths*, or lines of equal production, using Figs. 21 (page 73), 22 (page 74), and 33 (page 108) as models. (See also page 421.) Put the isopleths at the following positions: wheat 15, 20, 25; barley 25, 30, 35; oats and corn 20, 30, 40; potatoes 100, 150, 200; tobacco 700, 1100, 1500; cotton 120, 180, 240; hay 1.50, 2.25, 3.00. Remember that *all* the lines must always be inserted. The production of hay, for example, is 1.33 tons per acre in Texas and 2.27 in New Mexico. Therefore the lines for 1.50 and 2.00 must both pass between the figures for the two states.

Now shade your map in four shades, the heaviest indicating a production per acre higher than is indicated by the highest of the lines which we shall hereafter call isopleths, the next between the two highest isopleths, and so on. What differences do you notice between the areas where the total production is greatest and where the yield per acre is greatest? Explain these as far as possible on the basis of (*a*) care in cultivation, (*b*) irrigation, (*c*) relief, and (*d*) density of population.

In general the regions where a crop is raised most abundantly indicate its optimum climate, provided the conditions of relief, soil, labor, etc., do not interfere. If the places where the yield is greatest per acre differ from those where the total yield is greatest, it generally means that man somehow provides conditions which artificially give the plants the optimum in other respects beside natural climate. Explain how fertilizers, cultivation, irrigation, and shelter under cloth such as tobacco receives in the North, bear out this statement.

What advantage do you see in isopleth maps of this kind compared with maps of the kind used in Exercise 4? What disadvantage do you see when the isopleth map gives a single figure for a large state like Texas?

6. Repeat Exercise 4, but instead of a crop use one of the animals in Table 20. Let the symbols indicate the following numbers:

Columns A–G.		Column H (Chickens.)		Column I (Eggs.)	
No. 1.....	1,000,000	No. 1....	10,000,000	No. 1....	20,000,000
2.....	500,000	2....	5,000,000	2....	10,000,000
3.....	200,000	3....	2,000,000	3....	4,000,000
4.....	10,000 to 100,000	4....	500,000 to 100,000	4....	1,000,000 to 200,000
Omit under 10,000		Omit under 100,000		Omit under 200,000	

Explain the distribution of the animals in relation to climate as in the last exercise, but remember that the optimum for an animal depends not only on the direct effect of the climate but also on its effect on the plants which form the animal's chief food.

7. Apply the directions of Exercise 4 to a study of the world relations of the crop which you studied in Exercise 4, or to some other crop studied by one of your classmates. Use a large desk map of the world, and base your work on Table 11. Omit the figures for the continents as a whole. In using Table 11 let the symbols represent the following amounts:

Columns A–E and G.	Column F.	Column H.
No. 1. 100 million bushels of grain or potatoes	No. 1. 10,000 million pounds of rice	No. 1. 1000 thousand bales of cotton
2. 50	2. 5,000	2. 500
3. 20	3. 2,000	3. 200
4. 5 or less	4. 500 or less	4. 50 or less

Column I.	Column J.
No. 1. 100 million pounds of tobacco	No. 1. 500 thousand short tons of sugar
2. 50	2. 250
3. 20	3. 100
4. 5 or less	4. 25 or less

In determining the climatic optima of the various products on the basis of the world maps omit the directions in Exercise 4 as to length of the growing season. For places in the southern hemisphere use the temperature map for January (Fig. 4) instead of July. Point out how a study of the distribution of a given product in the world as a whole modifies or confirms the conclusions based on the United States.

Make a separate study of sugar, and compare the climatic optima of the two chief plants from which sugar is made.

8. Study the yield per acre of the crop whose total amounts in different countries were studied in Exercise 7. This is given in Table 13, from which an isopleth map should be made as directed in Exercise 5. Shade only the parts of the map for which data are given, for in most other areas there is almost no production. Compare the yield per acre with the total yield in each country as shown in Exercise 7.

9. Study the relation of some animal to climate in the various countries of the world, as you studied it for the United States in Exercise 6. Make a map based on one of the columns in Table 14, letting the symbols indicate the following: No. 1, 4000; No. 2, 2000; No. 3, 800; No. 4, 200 or less. Put the symbol where the animals are actually found; for example, in west central and southwestern Siberia, southern Canada, and northeastern Argentina.

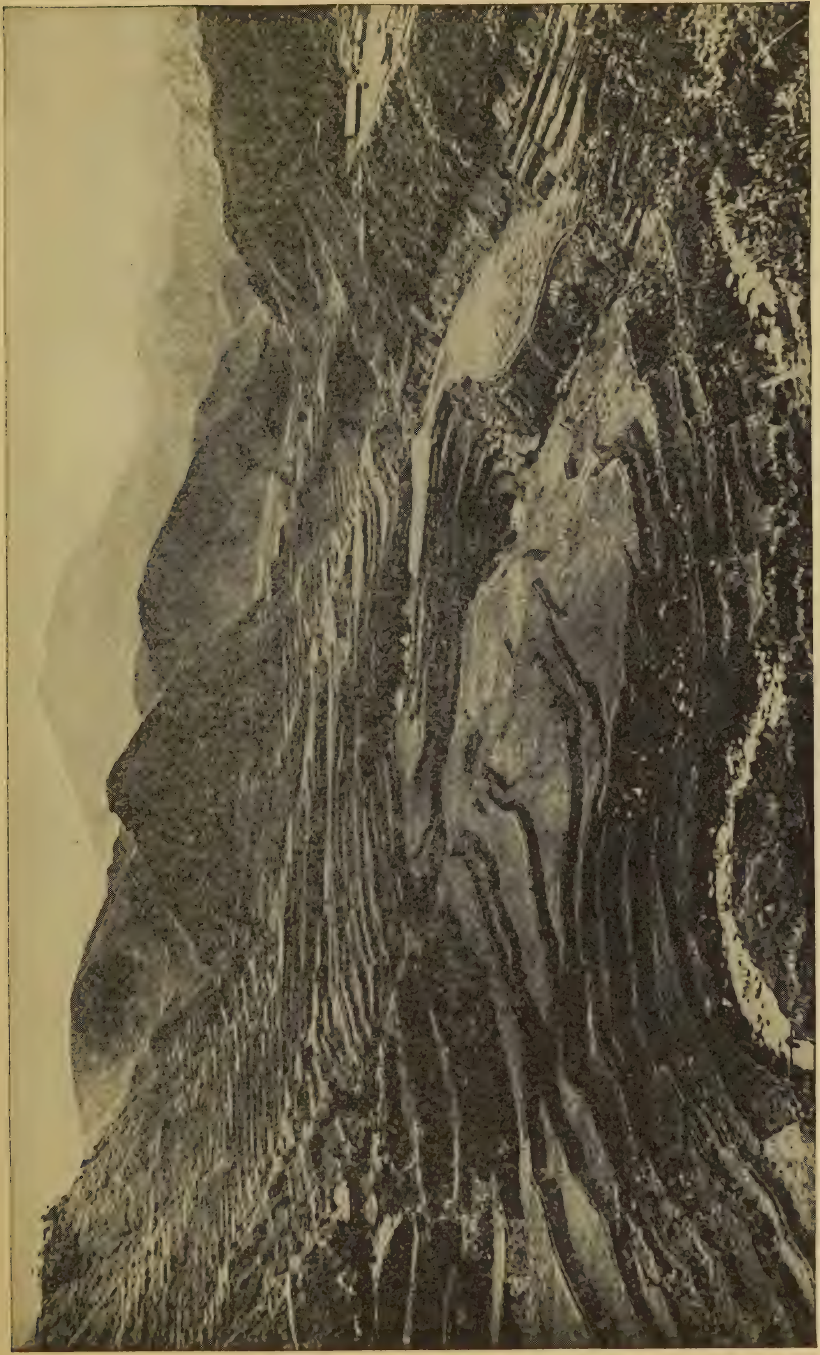
10. From one of the columns numbered A to F in the first part of Table 15, make an isopleth map for the animal used in Exercise 9. Compare the two maps. Put the isopleths at 2, 10, and 40. Use shading as follows: (*a*) heavy, over 40; (*b*) fairly heavy, 10 to 40; (*c*) medium, 2 to 10; (*d*) light, under 2; and (*e*) unshaded, the areas for which no data are available. In large countries like Canada, Siberia, Brazil, and Argentina where animals are abundant in one part but scarce in another, use your judgment as to what parts to shade. For example, the number of horses per square mile in all Canada is only 0.8 but in the south the number is as great as in adjacent parts of the United States, while vast areas in the north have no horses. Compare your isopleth map with the quantity map of Exercise 9.

CHAPTER III

THE EFFECT OF RELIEF ON PRODUCTION

In a region where there are only mild differences of climate, such as the United States east of the Mississippi River and north of the Ohio, the most noteworthy differences in the amount and kind of production are due to relief, that is to hills and valleys, plains and plateaus, mountains and basins. The prairie products, for example, are widely different from those of the Allegheny Plateau; and the products of a given area in the Berkshires or Adirondacks are not half so abundant and varied as those of an equal area in the lake plain of New York or in the Connecticut Valley. The differences due to relief are often evident from mile to mile or even in shorter distances. Many people who have never been in climates appreciably different from their own have seen great contrasts in the kind, quantity, and quality of the products of two regions because of differences in relief.

Why Rugged Relief Limits Production.—The relief of the land has a pronounced effect on both the amount and the kind of products. Relief influences the *amount* of production partly through the limitation of the areas that can be cultivated, and partly through transportation. The area available for cultivation in a rugged region is limited by steep slopes, thin rocky soil, and the local climate. The steep slopes prohibit the economical use of power, for if an automobile on a steep smooth road must slow down and change gears, how much harder it must be for a horse or a tractor to work on a rough hillside. The chief difficulty, however, is the thinness of the soil which forms a slight veneer resting directly upon rock with little subsoil. After a week's exposure to the hot sun a soil of this sort 10 inches thick usually becomes so thoroughly parched that plant life suffers. A similar thickness of soil over a porous subsoil does not become dry so soon and even when dry is not so harmful to vegetation. Roots can penetrate it and enter the subsoil whose depth enables it to hold water a long time. A second difficulty with the soil in rugged regions is the tendency of the rain to cause gullies even where the slopes are not very steep. Thousands of small, but steep-sided gullies have thus been worn in carelessly cultivated hillsides in the Carolinas and Georgia.



Keystone View Company.

FIG. 9.—Terraced Valley at Benane, Philippine Islands, Irrigated for Rice Culture.

Man's need of level land for cultivation.

The only permanent way to prevent this is to build level terraces as has been done on an enormous scale in China, Japan, Peru, Syria and many other rugged regions. Taken together, the difficulty of working on slopes, the thinness of the soil, and its tendency to be washed away discourage people from cultivating sloping land, and lead them to choose level ground when they can get it. With the increasing use of machinery this tendency becomes stronger.

Climate imposes still further limitations on the area that can be cultivated in regions of high relief. For example, in southern Utah beautiful rolling plateaus at a height of 7000–9000 feet would do excellently for agriculture provided they were not so high. As it is, the slopes are covered with a wonderful growth of grass and sometimes with pines making a delightful park-like effect. There is no cultivation, however, because the summers are too short and cool. Hence the only products are wool and mutton, which are probably not a tenth as valuable as the products which might grow if the relief were less and the plateau stood at a lower level, provided this could happen without a diminution of rainfall.

A rugged relief reduces production by its effect on transportation as well as on soil and climate. Not only does the construction and maintenance of roads in a rough country cost a great deal, but the roads must necessarily be long and winding with many steep grades. With all this goes the fact that the distance to the railroad is likely to be great because the railroads usually follow the level plains and the broad open valleys. Hence, good land in a mountain valley is left uncultivated, as in many of the smaller "parks," or flat valley floors among the Rockies. Such places might yield large crops, but the cost of getting them to market is so great that it does not pay.

The Quality of the Products in Rugged Regions.—Quality as well as quantity is important. Where production is possible in rugged regions the quality of the products is often high. In countries like China and Italy some of the most productive land and some of the finest crops are found on little tracts in the bottoms of valleys or on the terraced sides of mountains where the relief is rugged. Where only a little land is available it is likely to be much more carefully cultivated than are the broad level plains in countries where land is abundant. Thus one of the first things to understand about a rugged region is that although the business man cannot expect so great an abundance of products as in a plain, he may find that acre for acre the land in the rugged region is better cultivated than in the plain, and that the products are of correspondingly high quality. The oranges in some of the small valleys north of the main orange area of California, the apples

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on the hillsides of New Hampshire, and the grapes or currants of Greece are examples of high-grade products in rugged regions.

Connecticut as an Example of the Effect of Relief.—Connecticut offers a good example of the effect of relief on production. In 1850 that state was important as a producer of farm products. About 57 acres out of every hundred were improved; that is, either under cultivation or forming part of a rotation so that they were sometimes cultivated. In 1920 only 23 acres out of every hundred were improved. With this diminution in cultivation has gone a decline in population in about half the townships, or "towns" as they are called in New England. But the decline is limited to the "hill towns" which lie in north and south belts at a distance from the main valleys of the Thames, Connecticut, and Naugatuck Rivers where the railroads are chiefly located. The decline in farm area does not mean a loss of markets, for the low parts of the state, both in the valleys and along the coast, have increased greatly in population, both because of manufacturing and because there is more farming than ever before.

The reason the hill towns of Connecticut, and of all the eastern states, have declined in agriculture is simply that rugged land, even though not mountainous, cannot compete with the level prairies, for example. The fact that in Indiana in 1920 about 72 per cent of all the land was reckoned as improved while in Connecticut the percentage was only 23 is not because the farmers of Connecticut are less competent than those of Indiana. Acre for acre the cultivated parts of the farms in southern New England yield products worth about twice as much as do those of the richest prairie states, as appears in the following table.

	Average Value of All Crops per Acre of Cultivated Land in 1919.	AVERAGE YIELD PER ACRE IN BUSHELS, 1919.		
		Corn.	Potatoes.	Oats.
Connecticut	$85	49	75	27
Massachusetts	77	51	87	30
Indiana	40	35	40	31
Iowa	42	41	45	34

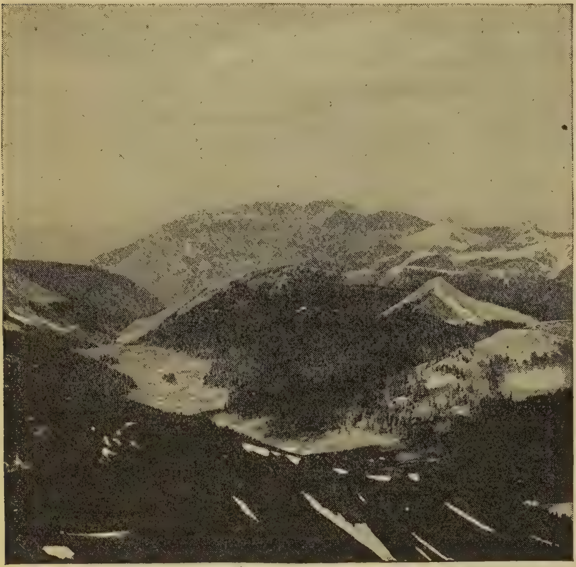
Because level land is scarce and a splendid market is available close at hand in the manufacturing towns it pays to cultivate the farms of the northeastern states very carefully, as is the case in Switzerland, Japan, parts of California and many other rugged lands.

How Relief Controls the Nature of the Products.—The relief of a region influences the kind of products as well as their quantity and quality. In the table of the world's chief products in the preceding chapter, only three out of the seventeen food products are more abundant in mountains than in plains, namely, sheep, coffee and tea. Among the non-metallic raw materials only two, or at most three, out of six, i.e., wood and wool, and perhaps raw silk, come mainly from rugged regions; among the materials for fuel and power only water comes mainly from such regions, although coal is found partly in regions of moderate relief. Among the metals, however, all except iron come chiefly from regions of high relief, and even iron comes mostly from old worn-down mountains. Hence in the following paragraphs we shall discuss only five of the 24 chief products that are derived directly from plants or animals, namely, sheep, wool, wood, coffee and tea; for these alone, unless we include silk, are produced largely in rugged regions. Water is left for the chapter on power. Among the nine mineral products, on the other hand, at least six and perhaps more are derived mainly from rugged regions.

Sheep, the most Important Animal of Rugged Regions.—Although sheep and wool are mentioned separately in the table of the world's chief products, they should be considered together. Wild sheep are found only in mountainous regions, for example, the Rocky Mountains, the Caucasus, and the Himalayas. In this they are quite unlike cattle, horses, donkeys, pigs, and camels, which are animals of the plains. When the sheep was domesticated several thousand years ago it began to lose many of its former qualities and habits. Its power of taking care of itself was impaired; it ceased to run and leap as freely as of old; it learned to obey a shepherd rather than its own leaders; and its size and wool were increased by selecting the best specimens. It also became adapted to new conditions of climate and relief. Nevertheless, sheep still thrive best in fairly cool mountainous regions where there is plenty of short sweet grass and where the air is often moist and the nights fairly cool. Hence, many of the places famous for sheep are rugged regions like the Sierra Nevadas and other western mountains where the sheep are driven far into the forest reserves each summer; Scotland, where the sheep are fed on the dripping moors; Spain, where they migrate in vast flocks up into the cool mountains each summer; and the higher parts of western and central Asia where nomads such as the Afghans, Khirghiz and Mongols pitch their rough tents at the highest elevations in summer in order that their flocks may have the best grass. Even at an altitude of 16,000 or 17,000 feet the Tibetan shepherds are found crouching under little tents close to the perpetual snow.

Although the best sheep for mutton were first developed in England and the best for wool,—the Merino—in Spain, the greatest commercial sources of both meat and wool are new countries such as Australia and South America. Europe, to be sure, still has more sheep than any other continent and their quality is probably the highest, but for the most part their products are used locally. It must be remembered that quantity and quality by no means necessarily go together. The quantity of mutton and wool available for the market depends largely on the amount of land fit for sheep grazing and not needed for other purposes. Australia and Argentina are great sheep countries not because they are peculiarly adapted to the sheep industry, but because being fairly well adapted, they have vast available areas. The common history of new countries that are covered with grass is that the early settlers often try to raise both sheep and cattle. But the sheep, being mountain animals adapted to eating grass which cannot grow long because of the low temperature, bite off the grass very short and often pull up the roots. Thus they clean off the ground so completely that the cattle have hard work to obtain a living. Accordingly there is usually a bitter quarrel between sheep men and cattle men, a quarrel which in the past in the western United States sometimes led to shooting. Since cattle usually pay better than sheep on good land, most of the sheep are ultimately forced into the mountains or into the drier regions less favorable for cattle. Thus in Australia the sheep industry is very prominent because a vast amount of land is not yet used for either cattle or agriculture, and much of it never can be. The sheep is the animal of the poor lands left over when more productive animals and plants have occupied as much as they profitably can, and such lands are likely to be rugged.

Why Trees are Mainly a Product of Regions of Rugged Relief.—Although lumber is one of the world's most important products, the areas of production are being steadily reduced. The growth of trees is so slow that on good land the production of wood per year is rarely worth as much as the product of the same area when used for crops or even cattle. Moreover people do not like to wait fifty or a hundred years to harvest a crop. Hence, trees for the production of lumber are gradually being restricted to lands where cultivation is difficult or unprofitable. The difficulty may be due to climate as in the cold plains of Siberia, and the hot plains of the Amazon. It may be due to a combination of soil, swamps and other factors which prevent certain lands from being used for crops, as in the Gulf States. Where lowlands are favorable in climate and soil, the chief reason why land is left in forests is ruggedness. In this respect trees are like sheep. In fact, sheep and lumber are two of the main products which rugged regions are likely still to produce after all the available land of gentle relief has been otherwise used, but sheep flourish in the drier regions, and timber trees in the moister areas. Hence, to-day the rougher parts of New England, New York, Michigan, Wisconsin, and Minnesota, the southern Appalachian region, the higher parts of the Rockies and of the ranges farther west, and especially the western slope of the ranges near the Pacific Ocean in northern California, Oregon, and Washington are among the main lumber regions of the United States. Nevertheless, it must not be overlooked that much lumber is produced in certain lowlands which have not yet been utilized for farms; Louisiana and Mississippi are thus among the chief lumber states.



Courtesy, U. S. Forest Service.

Fig. 10.—Effect of Relief on Vegetation, San Juan Mountains, Rio Grande National Forest, Colorado.

The presence of mountains is often a help in producing the optimum climate for trees, for the mountains tend to cause rain not only on their windward slopes but often on the adjacent portion of lowlands. We judge of the optimum from the size and vigor of the trees. Much the finest conifers grow in the bottom lands of the wet Pacific slopes of the western mountains of the United States. That region produces the Oregon pine, or Douglas fir as it really is, which to-day rivals the southern pine as a wood available in large quantities for general purposes; it also produces the Washington spruce, the best kind of wood for airplanes where lightness, strength, and freedom from knots must be combined; the great redwoods of the California coast; and the giant sequoias, 300 feet high and 20 or even 30 feet in diameter at the base, and often 2000 or even 3000 years old. The southern slopes of the Himalayas at altitudes of 5000 feet or more favor a similar, but less wonderful development of conifers, while the giant cedars of Lebanon, which are now almost extinct, on the western slope of the Lebanon range in Syria, seem to have been most vigorous when that region also enjoyed a climate similar to that of the coast ranges of our Pacific states. The essential features of that climate are first, such an abundance of snow in winter that the ground cannot freeze deeply and that the trees cannot suffer from the dryness which is especially injurious to conifers when all the moisture in the soil is frozen. A second essential is enough precipitation during the cooler months and a low enough temperature in summer so that in spite of a summer season with little rain, the ground does not become dry. Where the finest conifers grow, the summer months rarely have an average temperature above 60°, while the winter months are either fairly mild or have so heavy a snowfall that the soil does not freeze deeply. Such conditions prevail primarily on the western slopes of mountains between latitudes 30° and 45°, but may prevail elsewhere. They are common chiefly on mountains because only where the land rises steeply not far from the sea is there likely to be enough rain and a sufficiently mild temperature. Not all mountains with windward slopes facing a great ocean, however, produce fine forests. In Alaska, although the forests on the Pacific slope are very dense, the low temperature causes the trees to be small and poor like those of Siberia, except in the southern part close to sea level where a fairly high summer temperature permits fine trees to grow.

The deciduous trees which drop their broad, flat leaves each year originally showed an unusually fine development in the deep-soiled, well-watered lowlands of the southeastern quarter of the United States. These areas, however, have been cleared for agriculture and now the best deciduous forests grow among mountains. Almost nowhere do great oaks, beeches, maples, chestnuts, tulips, ashes, and other trees make a finer growth than in North Carolina at the eastern base of the southern Appalachians. There the trunks of the trees often rise straight up fifty or seventy-five feet before branching and sometimes continue another fifty above that. In summer the climate is warmer and rainier than that of the Oregon region most favorable to the conifers, and that is the chief reason why deciduous trees rather than conifers prevail. Here, as in the other case, the presence of the mountains causing abundant rain helps in producing excellent stands of timber. A still better region for the broad-leaved trees is found in warm regions like the Amazon basin, especially the eastern base of the Andes. There the high temperature at all seasons causes most of the trees to be evergreen hardwoods like mahogany and rosewood. The relief of the Andes is important largely because their great height forces the easterly trade winds to begin to rise far out on the plain, and thus helps to produce abundant moisture where the soil is deep and the temperature high. As yet the demand for lumber is not strong enough to cause the hardwoods of the moist tropical regions to be cut extensively even in the plains, but as time goes on the lower parts of the moist, rugged tropical regions will presumably rank among the world's greatest timber regions. A given area near the eastern foot of the Andes in Brazil where the drainage is good, where showers are frequent, and where the sun shines warmly, produces two to six times as much wood each year as the best deciduous areas in the Appalachians.

Trees as the Food Producers of Rugged Regions.—Today people usually think of trees as sources of lumber rather than of food. Yet even now great amounts of food are derived from trees, and the quantity is steadily increasing. This increase means that rugged lands are becoming more and more valuable for agriculture as well as for sheep raising or lumbering. The commonest food product derived from trees is fruit, and fruit trees are well adapted to rugged regions. One reason is that they need little cultivation and therefore can grow in places where crops like potatoes are unprofitable. Another reason is that one of the great obstacles to fruit raising is late frosts in the spring, which nip the blossoms, and to a less extent early autumn frosts which injure the fruit while ripening. On the lower slopes in rugged regions frosts do not occur so late in the spring or so early in the autumn as in level regions. At night the air which is in contact with the rapidly cooling ground naturally loses its heat most quickly. The air thus cooled flows down the slopes and is replaced by warm air. Thus, while heavy frosts may occur in the valley bottoms, the slopes remain relatively warm, as is known to almost everyone who often walks up or down hill at night. Accordingly, many farmers of the eastern states plant apple and especially peach trees on slopes so steep that ordinary cultivation is difficult. Grapes are another crop adapted to such slopes.

In the United States the steeper slopes are not being used for nuts except experimentally. In Spain, Italy, and Syria some of the finest walnut and chestnut groves cover slopes so steep that each tree has to have a little terrace around its foot to retain the soil. Again, in the Mediterranean regions, especially from south Italy eastward, the olive is one of the main sources of the fatty food which is essential to a good diet. In old Greece there are four olive trees for each inhabitant, and these yield 50 to 80 pounds of preserved olives per person each year and about three gallons of oil. The crop stands next to the small Corinth grape or currant in value, and is of much greater real importance. In California, and other subtropical countries the olive is also beginning to be important. It is one of the best crops for a rugged country with a dry summer, for the tree needs almost no summer rain.

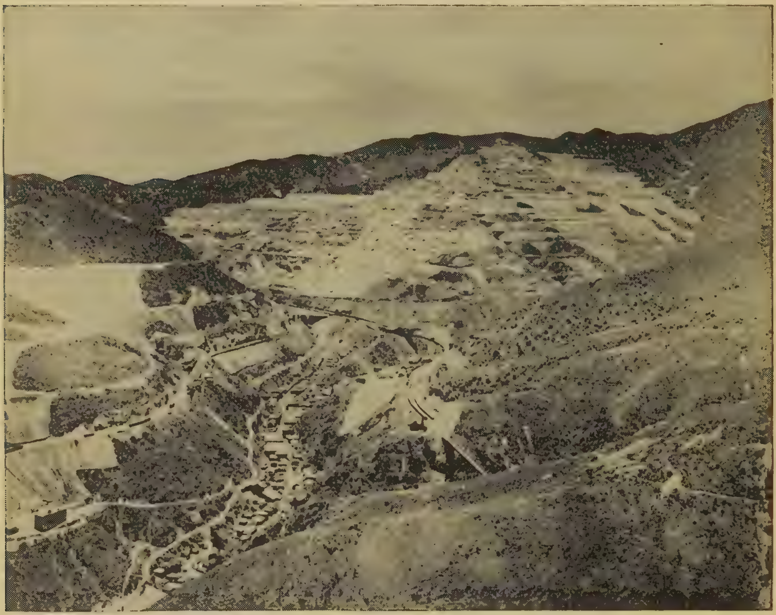
As population increases and as man's needs also increase new sources of food and raw materials are constantly required. A hopeful method of meeting this need, as Professor J. Russell Smith has well pointed out, is to utilize the vast areas of rugged relief. About three-fifths of Tennessee, four-fifths of Japan, six-sevenths of Washington, and nine-tenths of New England remain untilled, and this is largely because they are rough. Even in the production of lumber these large areas are used only imperfectly and unscientifically. If men were guided by science, and if they were able to see far enough into the future, many of these rugged areas might become as valuable as the chestnut orchards of France which are among the most valuable lands in that country. The future of such areas depends largely on the development of quickly growing varieties of nut and fruit trees by the same processes which have caused corn, wheat, and many vegetables to yield ten or twenty times as much as in their primitive states.

Tree crops have important advantages. A tree, when once started, can be left almost to itself. There is no need of sowing the land each spring, and then going over every foot of it to reap the crop in the fall, and while cultivation is important, it need not be so intensive as for ordinary annual crops. On the slopes of the Appalachian Mountains in Virginia and New York, for example, and of the White and Green Mountains in New England apple orchards are beginning to cover spots that formerly were given over wholly to forest. A little pruning in winter, some spraying in the spring, and the cutting of the brush and undergrowth in the summer comprise all the necessary cultivation. Good roads are not essential, for practically all the hauling is down hill.

Coffee and Tea as Products of Rugged Regions.—What has been said above applies to certain tropical crops as well as to those of more northern regions. Coffee and tea can be raised on slopes as well as on plains, for they need abundance of both sun and rain and must have good drainage, while in the hotter regions of its growth the coffee also needs shade. These conditions are well met where winds from the ocean blow over mountains, as in Brazil, Ceylon, the eastern Himalayas of Assam, and southeastern China. In such places showers are frequent enough to keep the ground moist, yet the sun shines much of the time and the ground does not become waterlogged.

In the table of the world's chief products (page 14) those produced almost wholly in cyclonic regions are double starred, those produced in both cyclonic and other regions have a single star, and those derived chiefly from non-cyclonic regions are not marked. Of the six organic products which come chiefly from non-cyclonic regions three, namely, coffee, tea, and rubber, can be produced as well or better in rugged regions than in plains, while three, rice, millet, and cotton, are better adapted to the plains. On the other hand, of the ten organic products which are limited largely to cyclonic regions, namely, wheat, potatoes, dairy products, oats, rye, barley, swine, raw silk, hay and horses, the only one which is as well adapted to rugged regions as to plains is raw silk, which may be called a tree crop. This raises the question whether in the future the rugged regions of the tropics are more likely to yield a great abundance and variety of products than are the rugged regions of cooler climates.

The Relation of Metallic Ores to Relief.—It is well known that most ores are found among mountains. Ores, it will be remembered, are rocks which contain an unusually large per cent of certain metals which are scattered in minute quantities in almost all rocks. It is also well known that the quantity of metallic ores varies greatly from one mountain system to another. For example, in North America the eastern mountains forming the Appalachian system contain relatively little ore aside from low-grade iron. On the other hand the western mountains contain a great variety and abundance of ores distributed all the way from Alaska to Mexico. A similar condition prevails in



Courtesy, U. S. Bureau of Mines and Mr. R. N. Hunt.

FIG. 11.—Mines of Utah Copper Company at Bingham near Salt Lake City.
Man's need of level land for transportation.

Europe. Except for the abundant and excellent iron ores of Sweden, the northwestern mountains from Ireland and Scotland through Scandinavia to Finland contain almost as few ores as do the Appalachians. The Alps likewise supply almost no metals. The only mountains in central or western Europe that contain many ores other than iron are those of Bohemia and the neighboring parts of Germany, but even there the supply is small. Only in the southern peninsulas of Spain, Italy, and the Balkans and in the eastern ranges of the Urals and Caucasus is there a great variety and abundance of metallic ores. Farther east in Turkey, Persia, and Central Asia, valuable ores appear to be as numerous as in the similar parts of North America. Corresponding conditions are found in the other continents, namely, few ores in some of the mountains and many in others. In every case the greatest variety and abundance of ores is found not only in regions of rugged relief, but to a large extent in the drier parts of the continent.

Why Ores are Found Among Mountains.—Let us first see why productive metallic ores are largely limited to mountainous regions, and then why they occur chiefly in dry regions. Five reasons for their occurrence among mountains are commonly given, while a sixth and more important reason is less emphasized. (1) In rugged regions the earth's surface is deeply gashed by valleys, thus exposing the rocks to a depth of hundreds or thousands of feet. (2) The rocks of rugged regions have generally been much folded and crumpled, thus bringing to the surface many formations which even the deepest valleys would otherwise never penetrate. (3) Where the slopes are steep the soil is thin, and bare rock is exposed so that valuable minerals can easily be discovered. In regions of low relief on the contrary the soil is often so deep that no rock is visible for miles. (4) Among mountains the chief process is erosion whereby new and deeper layers are brought to light. In level regions the most important geological processes are generally the weathering and deposition of soil, thus covering the underlying rocks deeper and deeper. (5) The heavy metals, gold and platinum, form placer deposits such as those of California and the Urals only where the slopes are steep enough so that the fragments of metal can be carried by running water. In such cases bits of metal from a wide area are brought together by tributary streams and carried in a main stream until it reaches relatively gentle slopes and begins to flow so slowly that the heavy metal falls to the bottom, while all but a small fraction of the stream's load of gravel, sand and silt is carried further.

(6) The reasons given in the last paragraph seem in themselves sufficient to account for the much greater production of metals in mountains than in plains, but there is a still more fundamental reason.

In regions of rugged relief there has usually been greater opportunity for the formation of ores than in level regions. The formation of ores usually requires that the earth's crust be pierced by molten masses of igneous rock, or broken by faults, or shattered by the folding and bending of the rocks. Such movements on a large scale occur only where the earth's crust is being upheaved into mountains.

How Ores are Formed.—In order to understand why metals are produced in places where the earth's crust is broken by volcanoes and faults, let us see how ores are formed. Most of the igneous rocks which constitute the main mass of the earth's crust contain very small quantities of many metals. Except in the case of iron and aluminum, the two most abundant metals, the quantities found originally in the igneous rocks are seldom great enough to be profitably extracted until the metals have been segregated or concentrated by some process of nature. Even with iron and aluminum a process of segregation is usually needed whereby the tiny bits of metallic compounds scattered through a great mass of rock may be brought together into ore bodies of appreciable size. This process of segregation is extremely important, for without it the metals could scarcely have been used by man. It takes place in two chief ways, both of which occur much more readily in a mountainous region than in a plain. The first, but less common way, is in masses of molten rock which push up through the earth's crust and often, although not always, reach the surface in volcanoes. Occasionally when such a mass of igneous rock is slowly cooling below the surface, certain metallic minerals which form crystals at high temperatures may solidify before the others and thus collect near the margins of the molten mass and later be carried to a position where they finally come to rest as a body of ore. The magnetic form of iron known as magnetite, which occurs abundantly in Sweden, is the commonest mineral of this type. At other times the gases which accompany a rising mass of molten rock come in contact with the cool rocks on all sides. The gases frequently contain metals, and if the surrounding rock is of the right kind, especially if it is limestone, the metals may be deposited to form a zone of ore bordering the igneous intrusion. Iron and copper ores are the commonest minerals formed in this way, but lead, zinc, and gold may also occur.

The second and more important way in which the segregation of ores occurs is through the action of water. As water percolates through the rocks it dissolves the widely scattered bits of the oxides, sulphides, or other compounds of the metals, and later deposits them after the solution has become concentrated by the addition of material from a wide area. Water-formed ores are of two classes. One is formed at considerable depths by hot water given off from the igneous rocks themselves. This magmatic water, as it is usually called, generally carries the metals upward, and this process has given rise to much of the world's metallic wealth, including for example, practically all the copper of the United States, the gold veins of California, the silver deposits of Cobalt in Ontario, and the lead of Germany. The other class of water-formed ores is of much less importance. It consists of ores formed by water which percolates downward from the surface. The large lead and zinc deposits of the Mississippi Valley in Wisconsin, Illinois, and Missouri were formed in this way. The surface water may produce another effect upon any of the three kinds of ores already mentioned. By trickling down through the deposits it may dissolve metals from their upper parts and deposit them lower down, thus bringing about what is called secondary enrichment. This process produces relatively small bodies of extremely rich ore such as the upper part of the copper deposits of Arizona and of the famous Comstock silver lode in Nevada. It also produces great bodies of low-grade ore whose aggregate value is enormous. The great iron ore deposits of the Lake Superior region are supposed to be an example of deposits due to the action of water in a relatively dry and much faulted and folded mountain region of pre-Cambrian times.

The fact that the formation of ores is not only almost limited to a zone within a few thousand feet of the earth's surface but is highly spasmodic even there, is one reason why mining is so precarious an occupation. Ore bodies are prone not only to give out suddenly as soon as a mine penetrates below the level of enrichment, but to die out laterally. This is because underground water, whether from above or below, can penetrate the rocks only in fissures or in places where the rock has been shattered and crushed so that it is full of cracks, as happens when mountains are upheaved. That is why so many metallic ores are limited to narrow veins or to small zones on either side of places where the crust has been broken by faulting or shearing.

Why Ores are Abundant in Dry Regions.—We saw above that the dryness of such regions as Arizona and Mexico and the consequent scarcity of vegetation and the exposure of bare rock make it easy to discover whatever ores may exist. This dryness is partly due to mountains which shut out winds and rains from the ocean, thus adding another to the reasons why rugged regions are so important as sources of ore. But the world's largest dry areas owe their dryness to their latitude and continental position. The dryness allows the enrichment of ores by water to take place more effectively than in moist regions. When the deep-seated magmatic waters slowly well upward they finally reach a level where part of the dissolved metals is deposited. This level is much lower in dry regions than in moist, for it bears a definite relation to the level of permanent ground water. Because of the low level of ground water in dry regions the zone in which the enrichment of ores may take place is much thicker than in moist regions.

The Importance of Conservation.—This explanation of the reasons why metallic ore are more abundant in rugged and dry regions than elsewhere emphasizes the need of the greatest care in conserving the metals. The happy-go-lucky person who says, " Don't worry! Our descendants will find a way to get all the metals they need," simply displays his ignorance. Some valuable minerals may indeed be found by exploring deep down beneath the plains or mountains, but only where the geological structure is favorable. New bodies of ore will also some day be segregated by nature, but that will take millions of years. The main fact that we must face is this: No matter how skillful man may become in exploring the interior of the earth, he is not likely to find many ores at great depths. Beneath the plains fewer ores are likely to be found than in the mountains, although ores may abound where old mountains have been worn to gentle relief, as is the copper and iron region of Lake Superior. Even among the mountains and in the outer ten thousand feet of the earth's crust where ore deposits are formed, the chances of a constant succession of new discoveries of ore for generation after generation are not good. In scarcely more than half a century the work of mining has gone on so fast that in countries like the United States the best deposits are already known and are often well on the way toward exhaustion. Moreover, a large part of the ore formed in the past has long since been washed away by erosion and forever lost. Thus the prospect of finding new metals to last through the thousands or millions of years which may still be before mankind is slight. Knowledge of how slowly metals are segregated and formed into ores and of how limited are the regions where this is taking place ought to make the world extremely careful in its use of every kind of metal. It also adds to our realization of the value of rugged and dry regions to the future business of the world.

Why Fuels are Rare in Rugged Regions.—The effect of relief on fuels is quite different from its effect on ores. But with fuels, perhaps more than with ores, a wrong impression is likely to be created unless climate is considered in connection with relief. The original formation of coal long ago in geological times seems always to have taken place in regions of very gentle relief. Coal is formed in great swamps which must be surrounded by extensive plains, for otherwise the streams would bring in silt and destroy the purity of the coal. Moreover, if coal is uplifted into mountains, it is rapidly worn away. Of course, this is also true of metallic ores, but coal is relatively soft and easily eroded and it occurs chiefly in fairly moist climates where erosion is active, while ores, being formed at deeper levels and among harder rocks, are not eroded so rapidly. For these reasons most of the world's coal occurs in places like Illinois, England, eastern France, southern Russia, central Siberia, and northern China, where the relief is gentle. Some, to be sure, is found in rugged regions, and the coal which has been subjected to pressure by crustal folding and mountain building forms the best sorts, such as that of Wales, Sakhalin, and especially the anthracite of eastern Pennsylvania. There is not much of this, however, and vast quantities have been lost by erosion.

Contrary to general opinion, most of the coal appears to have been formed in mild temperate climates such as prevailed in middle and even fairly high latitudes throughout most of geological times. Extreme cold or aridity prevents vegetation from growing with sufficient rapidity, while steady high temperature causes the dead plants to decay so rapidly that coal probably cannot be formed even where vegetation is luxuriant as in the Amazon Valley. This illustrates the importance of climatic optima as discussed in the last chapter. The earth's climate today is generally supposed by geologists to be somewhat more severe than when the coal was formed. Hence, most coal is found in regions that now are either fairly cool, like the United States, England and northern China, or else cold like Spitzbergen, Siberia, Alaska, and the islands north of Canada. Coal is correspondingly scarce in warm regions and deserts. Even where it occurs in such regions, as in the thick beds of Sumatra it is usually brown coal of poor quality.

The occurrence of petroleum may perhaps be influenced by climate, but relief is far more important. Just how this liquid oil and its accompanying gas are formed is not yet certain, but apparently both are derived from plants or animals which flourished in the ocean. Suppose that a region where oceanic deposits are full of the remains of such plants and animals is elevated, broken, crumpled and dissected as in a typical mountain region of high relief. Since both oil and gas move through the pores of the many kinds of rock with comparative ease, the tilting of the strata and the deep dissection will allow the supplies of both to seep rapidly away and be lost. Hence, these products are characteristic of relatively gentle topography and of places where the folding or bending of the crust has been only enough to form slight but unbroken arches of rock which may be many miles in diameter and only a few dozen feet in height. Because oil and gas are light they are gradually buoyed up by the water in the rocks and finally accumulate in the top of the arches, provided a porous oil-bearing rock lies under one that is less porous. The rocks above such gently arched strata may be eroded into fairly rugged relief as in the Pennsylvania oil fields, but the valleys must not be deep enough or the rocks so crumpled and broken as to drain away the oil. Thus new supplies of the fuels are most likely to be found in regions of low relief, just as metallic ores can be most hopefully sought where the relief is rugged and the climate dry. Certain kinds of shale may indeed contain organic matter which can be converted into oil by heating, and it matters little whether such rocks are only a little disturbed as in Colorado or much folded as in Scotland.

Summary of Effects of Relief.—The importance of relief, as of almost every other factor that influences business, appears greater as we study it more carefully. A rugged relief, as we have seen, diminishes the production of most of the great products that depend on plants and animals. Sometimes it acts through the thinness of the soil, sometimes through transportation, and again through climate. Certain products, however, such as sheep and trees or bushes, are produced in greatest abundance in rugged regions, for they are crowded out of the level regions but can thrive among rough hills and mountains. Upon minerals the effect of relief is even greater than upon plants and animals. Not only are most minerals more easily discovered in rugged regions, especially if the ruggedness also tends to cause dryness, but the metals, in distinction from the fuels, are segregated more abundantly in such regions. Since relief also has a dominating influence upon transportation, it seems to stand second only to climate in its influence upon man's activities.

EXERCISES AND PROBLEMS

1. Study the effect of relief versus climate upon production as shown by the percentage of improved land in the United States. Insert the figures of Col. A, Table 10, in ink on an outline map. With a pencil apply the following shadings: (*a*) rugged regions, fairly heavy shading but not so dense as to conceal the figures; (*b*) regions of gentle relief, or plains, unshaded. Draw a north and south line to indicate the western boundary of the area where the rainfall is over twenty inches per year and where the climate is consequently favorable to agriculture without irrigation. List the states and their percentages of improved land according to the following four divisions which will appear on your map: (*a*) rugged regions with favorable climate; (*b*) regions of gentle relief with favorable climate; (*c*) rugged regions with unfavorable climate; (*d*) regions of gentle relief with unfavorable climate. From these figures what do you conclude as to the degree to which the amount of improved land is reduced by (*a*) ruggedness, and (*b*) an unfavorable climate?

Explain how peculiar conditions of relief help to explain the low percentage of improved land in Florida, Louisiana, and the Carolinas.

2. Compare the productive area of countries with rugged versus gentle relief. On the basis of Col. A, Table 9, divide the countries of one of the continents into two groups, those that are predominantly rugged, and those that are predominantly of gentle relief. Note that in Table 9, Col. A indicates all productive areas including not only improved land but forests, natural pastures, etc.

In the various continents pick out pairs of neighboring countries such as Chile and Argentina where the effect of differences in relief is especially evident in Col. A, Table 9. Pick out other pairs where the effect of climate is especially noticeable in determining the percentage of productive land. On the whole does climate or relief have more effect in determining the productive areas? Give your reasons.

3. From Table 1, make a list of the independent countries of Africa and Asia. Indicate whether each one is (*a*) mountainous, (*b*) partly mountains and partly plains, or (*c*) level. What connection can you see between independence and relief?

4. Effect of relief on lumber production. To the list of states prepared in Exercise 1 add the production of lumber per thousand people as given in Col. C, Table 28. Find the average for each of the four groups of states. How does the relative rank of each group according to these averages compare with the rank according to the percentage of productive land? What two states would it be fair to omit in both cases because their low relief has an effect much like that of rugged relief? Explain.

5. On the maps of Exercise 5, Chapter II, see whether there are any places where an unusually high yield per acre is found in rugged regions where it is not due to irrigation. Explain them.

6. The Abstract of the United States Census under the heading " Farms and Farm Property: 1850 to 1910 (1920) " gives a table showing the number of acres of " improved land in farms " and the " per cent of farm land improved," that is, the percentage of the total area of the average farm which is in some way cultivated or occupied by buildings. Make two graphs showing the number of acres and the percentages in 1850 and 1920 in New England and in the East North Central and South Atlantic states. How do the graphs illustrate the effect of relief?

7. In your own locality is there a highway once important but now abandoned in whole or in part. What factors have caused the change?

8. On a map of the United States shade in one color and mark (1) the five states having the most sheep in proportion to the inhabitants, and in another color and also mark (1) the five states having proportionally the most dairy cattle. (See Table 22, Cols. E and D). What is the general character of the topography of the sheep and cattle states respectively? Shade the next five of each kind, and mark them (2). Compare the first group with the second group in topography. How much do the two groups overlap. In what kind of state? Shade the next five states of each kind. How much overlapping is there in these groups? Is it among mountains or plains and in what kind of climate?

CHAPTER IV

THE PRODUCTIVITY OF THE SOIL

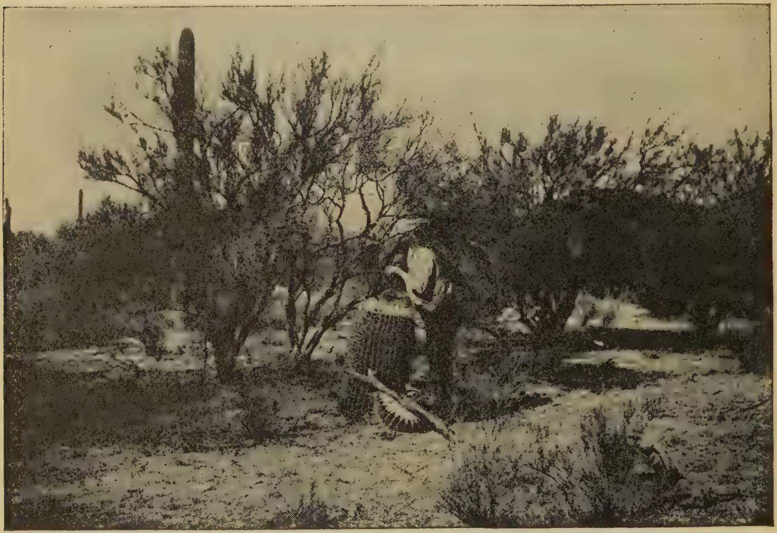
The Familiar Effects of the Soil on Production.—Soil, water, and air are the great sources of wealth. Aside from the metals all the great products listed in Chapter II are derived from them directly or indirectly. Plants alone yield perhaps 50 billion dollars worth of products each year, or 5 times as much as all the mineral wealth. In ordinary food products and fibers about 1 per cent of the total weight is derived from the soil, and in articles like beans this rises to about 4. The remainder, consisting of carbon, nitrogen, oxygen, and hydrogen, is derived from water or air and hence depends upon climate. Nevertheless, the quality of the soil has a most important effect. The quality varies enormously from place to place. Even in the same climate and with the same water supply one garden may produce the finest lettuce, beets, potatoes, and celery; while in another where the soil is poor the vegetables are stunted and stringy. The poverty of the crops in the sandy quartz soil of the Pine Barrens of New Jersey keeps the population relatively sparse, backward, and unproductive; it fosters lumbering and the cultivation of blueberries, one of the typical bush products characteristic of poor soils as well as of rugged relief.

But even a poor soil can be made to yield good crops if well fertilized. Western Long Island has poor sandy soil, while the eastern part has good soil. Yet the great market of New York City offers such advantages, the cost of transportation is relatively so small, and fresh vegetables can be delivered with so much less deterioration than is suffered even in cold storage, that the western end of the island contains some of the world's finest truck farms, while the eastern part is only moderately developed. It pays better to transport fertilizer and make the soil rich than to transport vegetables which lose their freshness on the way to market.

The Conditions that Make a Soil Valuable.—The value of a soil, including the subsoil, depends on its fineness, levelness, depth, and mellowness, and on the amount of available plant food. The first three qualities depend largely on relief. The soil of a plain is almost always fine-grained, level, and deep. The next quality, mellowness, or the ease with which the soil can be broken up and penetrated by roots, depends partly on the kind of rocks from which the soil is derived, for a granite soil is usually mellow while a limestone soil, though fertile, may be clayey and tough. It also depends on age, for an old soil is likely to have tough, clayey subsoil or hard pan which acts almost like rock, for the soluble parts are gradually leached away, leaving beds of almost insoluble clay. Finally the amount of plant food depends partly on climate, as explained below, and partly on the origin of the soil, for pure quartz, pure limestone, or any other single mineral rarely makes so good a soil as that which is derived from a mixture of diverse kinds of rocks. All over the world there are local areas, often of great size, where the quality of the soil is largely determined by the underlying rock. For example, fine sandstone disintegrates into grains of sand, which, being practically insoluble, form an infertile soil. Of this type are the sandy belts of the Atlantic Coastal Plain, and the central part of Wisconsin. Limestone is more apt to yield a fertile soil, as in the Blue Grass region of Kentucky, the Nashville Basin in Tennessee, and the Shenandoah Valley in Virginia. In certain tropical regions, such as Hawaii and Guatemala, an uncommonly fertile soil results from the recent weathering of lavas. In all parts of the world each type of rock forms its own special kind of soil, so that a great variety of soils may be found within small areas.

The Great Divisions of the Soil. (1) *Desert Soils.*—Aside from innumerable local divisions due to the underlying rock and the relief, three other great types of soil deserve study: (1) the extremely rich soils of deserts; (2) the fairly rich new soils of glaciated regions; and (3) the poor, leached, dehumified soils of many moist regions especially within the tropics. Desert basins commonly contain unusually good soil, as well as much that is gravelly, clayey, and saline. Several conditions improve much of the desert soil: (1) such soil has been transported so that portions derived from many different areas are usually well mixed, giving a good proportion of the necessary minerals. (2) It is fine-grained, deep, and friable because it has been carried far enough to be thoroughly pulverized and thoroughly exposed to the air. (3) It still contains almost all its original plant food, for the scanty rainfall does not leach out the valuable constituents. These qualities cause newly irrigated regions to produce wonderful crops, for in all dry regions the soil has something of the quality of desert soil. For the same reason, loess, like that of North China which is brought by the wind from a desert, is highly fertile. One of the arguments for large irrigation schemes is that the excellence of the soil reenforces the abundance of both water and sun in enabling huge crops to be raised from small areas with relatively little work. Of course the fertility of desert soil gradually diminishes under cultivation, but in the United States, even without special fertilization, the average yield of 12 main crops on irrigated land is about 30 per cent more per acre than on other lands.

(2) *Glacial Soils.*—In glaciated regions such as the eastern United States north of the Ohio River, the soil was distinctly improved by the advance of the ice which probably culminated 25,000 to 30,000 years ago. In some places, to be sure, the ice scraped off the soil and left little in its place, and in others it deposited sand, pebbles, and boulders. Elsewhere, however, it mixed many different kinds of rock débris together; it ground the material very fine; and it scoured from the rocks much new material which has not yet been leached of its plant food. Thus the soils of many states like New York, Ohio, Michigan, Illinois, Wisconsin, and Iowa were decidedly improved by the advance of the ice. For example in Wisconsin, Professor Whitbeck estimates that glaciation has caused the average value of all crops per square mile to show the following values compared with the crops in similar non-glaciated areas:



Courtesy of Dr. D. T. MacDougal.

FIG. 12.—Desert Vegetation near Tucson, Arizona.

The vegetation is unusually dense for a desert but very scanty compared with Fig. 13, in spite of the fact that the soil is very rich. The man is drinking the sap stored up in a barrel cactus.

	Sandstone Regions.	Limestone Regions.
Glaciated	$2776	$3828
Unglaciated	1968	2690

Similar benefit arises from glaciation in parts of Europe, especially the Black Earth region of Russia, where materials washed out from the ice seem to have found a final resting-place. Some glacial soils, especially on the borders of the glaciated areas where the soil is deep, fine-grained and level, have gradually been so much improved by the decay of vegetation and the accumulation of humus, that their fertility is second only to that of the soils of the desert. Such dark soils are found in the American prairie states and in south central Russia.

(3) *Soils of Moist Regions.* — The third great type of soils occurs in moist regions which have not been glaciated. Such soils vary from the fairly good quality of regions like eastern Pennsylvania with moderate rainfall and cold winters, to the red laterites of moist, hot regions in the torrid zone. These soils are usually old and well leached, but in middle and high latitudes they are usually supposed to be better than in low latitudes, for the plant foods are not leached away so fast. Moreover, some humus accumulates, whereas in tropical regions the dying plants usually decay so rapidly that little or no humus is formed and the nitrogen furnished by the plants is quickly washed away. The tropical laterites are called by Marbut "the end stage or death stage of

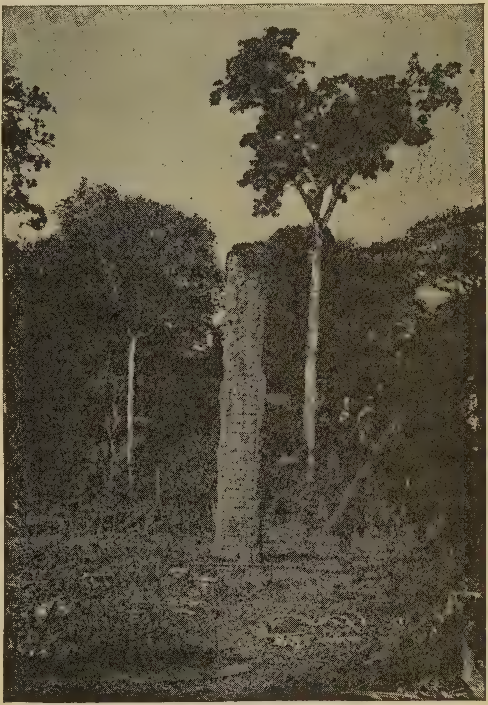


FIG. 13.—Huge Forest at Quirigua, Guatemala.

Soil no better than average and perhaps worse, but vegetation very dense because of highly favorable climate. The space in the foreground has been cleared in order to expose some remarkable ruins of the ancient Maya Indians. The large sandstone pillar is covered with hieroglyphic writing.

soils." Their lime, potash, and nitrates are much depleted. Thus on the whole, as one goes from a glaciated region where the soil is new and unleached to warm regions where the soil is old and thoroughly leached, or from a desert to a region of great humidity, the fertility of the soil declines.

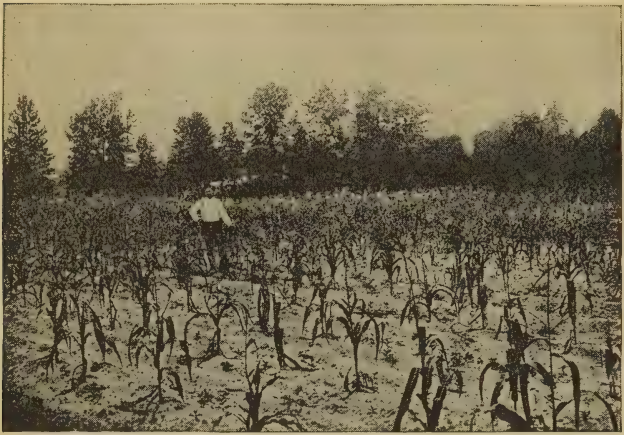

Courtesy, U. S. Bureau of Plant Industry.

Fig. 14.—Corn Grown in Poor Soil.

This picture was taken in a state which raises much more corn than the state of Fig. 15. The climatic advantage is in favor of this poor crop of corn.

This does not mean that there is a decline in the amount of vegetation, for a relatively poor soil in a warm moist climate bears more vegetation than the richest soil in a cold climate or a desert. (Figs. 12 to 15.) It merely means if all soils were given the same amount of water and sunshine, and the same temperature, desert soils would stand first; then fine glacial soils where humus has accumulated, and next those of non-glaciated regions which are cool enough so that leaching and decay are checked in winter and the accumulation of humus is possible. Below these stand the leached soils without humus, which

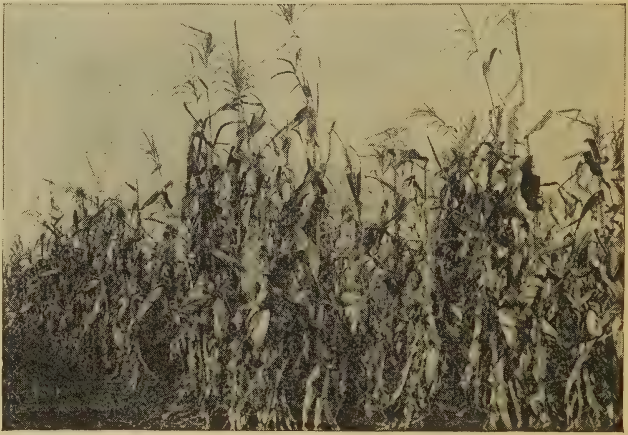

Courtesy, U. S. Bureau of Plant Industry.

Fig. 15.—Corn Grown in Good Soil.

require constant fertilization and deep plowing in order to raise good crops for more than a few seasons. These prevail in the southeastern United States and still more in the moist parts of the tropics. Last of all come the almost completely leached tropical soils of the laterite type where practically all the plant food is gone and agriculture is extremely difficult. An acre of irrigated desert land may produce perhaps ten times as much as an acre of laterite, and will retain its fertility many years.

The Utilization of New Soil.—As population increases there is a constant demand for larger supplies of food and raw materials. So far as the soil is concerned this demand can be met in two chief ways: (1) by using soils that are now uncultivated; (2) by more careful cultivation of soils now in use. Uncultivated soil is found in four kinds of localities: (1) in well-populated regions considerable areas are often uncultivated because too poor or too rugged to pay for the work needed to make them productive. (2) Tropical regions contain vast areas of unused soil which is rather poor in quality. (3) Unused soil is equally abundant in cold countries. In glaciated regions some of this is of excellent quality although very irregular in thickness. (4) Dry regions contain enormous areas of wonderfully rich soil.

Poor Tracts in Well Populated Areas.—Let us see which of these four kinds can be most profitably used. To begin near home, we have seen that in rugged regions like New England, the Appalachian states, and California, many unused tracts lie upon slopes among hills and mountains. We have also seen that in places like Long Island a relatively poor soil may be worth cultivating because of its nearness to a good market. As time goes on many other regions which are not now worth cultivating are sure to be used. Their use is partly a question of fertilizers, which will be discussed later, partly of finding cheap means of making terraces and using machinery on slopes, and partly of the development of markets not far away. In all the mountainous or hilly parts of the United States there is much good soil which could be profitably used if there were machines which could work on a slope as well as on a level, or which were as effective on small areas as on large. But there are no such machines. Until someone invents them the great improvements in modern transportation are likely to make it more profitable to develop distant regions where the relief is not a hindrance.

Utilization of Dry Areas.—Among the distant regions those that are cold may be dismissed briefly. Their climate renders their soil almost useless. This leaves the rich soil of dry regions and the poor soil of tropical regions. The dry regions have the advantage not only of wonderful soil, but of a climate which is almost ideal for many plants provided they have water, and which is fairly good for man—better at least than that of the tropical regions. Their great need is irrigation. At present about 19 million acres are irrigated in the United States, but nearly 32 million more might be irrigated if capital were available. At best, however, only about one-fifteenth of the 750 million acres of arid lands in the United States can be irrigated so long as we must rely on present methods. The great need is cheap power so that water can be pumped long distances. If power were cheap enough not only could all the water of rivers like the Colorado be used, but sea water could be distilled and pumped hundreds of miles. At present the prospect of securing such cheap power appears very slight.

Utilization of Tropical Soils.—The most hopeful source of new land in the immediate future seems to be the vast unused areas within the tropics. Since the warm climate enables more than one crop to be raised each year such land might yield two or more times as much per acre as similar land in temperate regions. One of the greatest difficulties is the poor health of the white man and the inefficiency of the natives. This will be discussed in another chapter. A second difficulty is the rapid and continuous growth of weeds, bushes, and especially tough grasses which hinder the growth of everything else. If tropical people were energetic, this could be overcome by plowing, but the plow is a rare implement in many tropical countries. Moreover, tropical draft animals are generally small and weak, or else, like the water buffalo, can work only in special surroundings, and hence cannot plow the tough sod formed by the luxuriant tropical grasses and other growths. Imported animals like the horse and ox deteriorate rapidly. Nevertheless, if labor were efficient, machine plows could be used on a large scale.

The third great difficulty is the poverty of the soil. This can be partly overcome by plowing, which turns up the lower soil, but this is a temporary expedient. The only effective way to maintain or increase the fertility of tropical soils and thereby gain the advantage of the highly favorable climate, appears to be to supply abundant fertilizers. The poverty of the upper soil and probably still more the rapid and persistent growth of weeds are responsible for the fact that in Central America many fields are cultivated only one or two years and then lie fallow from three to six ostensibly to permit the soil to decay still further and thus acquire new fertility. This involves an enormous waste of energy, for bushes 10 or 20 feet high grow in the fallow fields and must be cut before each crop is planted.

The Improvement of Old Lands.—We have seen that it is possible to increase the world's supply of food and raw materials not only by using new lands but by improving old lands which have not been well cared for. Nature's care of the soil is far better than man's. According to nature's method all plants decay where they grow. Thus they not only return to the soil all that they have taken from it, but the legumes add new materials from the air in the form of humus in which the most valuable part is not the carbon which gives the dark color, but the nitrates made from atmospheric nitrogen. When man reaps the crops and carries them away without using fertilizers he removes materials which nature cannot replace for a long time. Thus many soils show signs of exhaustion, and the crops grow poorer and poorer. For example, tobacco exhausts the soil so rapidly that the crop raised in the United States in a single year takes from the soil more than 28 million pounds of nitrogen, 29 million pounds of potassium, and about 2½ million pounds of phosphorus. Ordinary food products contain so much plant food that each year the sewage of the United States carries off 600 to 1200 million pounds of nitrogen, 200 to 400 million pounds of potassium, and 80 to 300 million pounds of phosphorus. If we could follow the wise Chinese example without detriment to health, we should save not only all the chemicals contained in sewage, but in street sweepings, weeds, and all sorts of waste products which we now throw away or burn.

The Problems of the Fertilizer Business.—Although nitrogen, potassium, and phosphorus are by no means the only plant foods, they are the most important. Oxygen, hydrogen, and carbon, to be sure, far exceed them in bulk in all plants, but can always be secured easily from air or water. Calcium (lime), iron, and sulphur are also important, but are present in most soils in sufficient amounts, or can easily be added. Nitrogen, potassium, and phosphorus, on the other hand, are so difficult to procure that the purchase and sale of nitrogen in the form of nitrates, potassium in the form of potash, and phosphorus in the form of phosphates is a highly important business. The nitrates involve commerce with Chile and with the Guano islands off the coast of South America where the supply of this nitrogenous phosphate is nearly exhausted. They demand factories where cotton hulls, garbage, the waste of slaughter houses and the slag from coke ovens are treated; they require the farmer to plant and plow into the soil certain leguminous crops such as clover and alfalfa which form little nitrogenous nodules on their roots. In recent years the need of nitrates has led to the erection of plants like the one at Muscle Shoals on the Tennessee River in Alabama, for the extraction of nitrogen from the air by using water power to develop electricity and thereby combine the nitrogen with lime or other products. The need of potash, which formerly came almost wholly from the vast beds of Stassfurt in Germany, has led to a search of the dry parts of the United States and to the establishment of plants where potash-bearing brines are treated, especially in Nebraska and in the arid states of the Southwest. Large amounts of potash have also been discovered in deep-lying ancient desert beds of Peruvian age in Texas where oil wells were being drilled.

The phosphates, as well as the nitrates and potash, are the basis of an active industry. Instead of being obliged to go abroad for supplies, however, or to search everywhere for them at home, as in the case of nitrates and potash, the United States is easily able to supply phosphates for export from the large deposits in the rocks of Tennessee and Florida; and also from old bones not large enough for buttons or other manufactured products. The need of phosphorus in foods was demonstrated in Wisconsin by feeding animals with rations deficient in phosphorus. It was found that the animals drew the phosphorus they needed from their own bones, which being thus weakened, were no longer able to support the body and the animal collapsed. Nor did they recover when fed a normal ration.

In spite of all the activities which depend directly on the fertilizer industry, the importance of fertilizers seems to be only in its early stages. The demand is constantly increasing, and presents one of the greatest problems of modern chemistry and engineering. The supplies of phosphate rocks of the United States will last a long time, but those of nitrogen and potassium are very limited compared with the probable demands of the future. The greatest source of new supplies seems to be the air for nitrogen and the water of the ocean and the deposits of old salt lakes for potassium. Kelp and other large seaweeds as well as marsh grasses are among the best fertilizers, for they store up much potash derived from the sea. One of the chief difficulties in getting fertilizers from the air and the sea is the vast amount of energy needed for evaporation, chemical changes, mechanical transportation, and deep mining. If power were sufficiently abundant and cheap, the supply of fertilizers might be indefinitely increased. In this respect, as in many others the problem of increasing the world's production is closely connected with the question of power. This is true no matter whether we wish to use uncultivated rugged tracts, irrigate the fertile soil of the desert, improve the poor soil of humid and tropical regions, or restore the exhausted soil of the long-settled parts of the world.

EXERCISES AND PROBLEMS

1. Explain the effect of soil and relief on the use of the land. Make a sketch map of an area near your home showing (*A*) the amount of land not used—i.e., in swamps, scrub lands, pasture lands, etc., (*B*) the land given over to home sites, (*C*) sustenance sites (improved land and pastures), (*D*) woodlands. Let different students do this if possible for a city area, a village area, and a rural area.

2. From soil maps and reports find out as much as possible about the soil of your immediate area.

Find two areas having the same kind of soil; one sloping, another level, and note the differences in use and productivity.

Note any differences in the vegetation of an area of uniform soil and account for them by one or more characteristics other than soil composition.

3. Several of the maps of the yield of crops per acre in Exercise 1, Chapter II, show the effect of new, unleached soil. Determine on which maps this is so and in what parts of the map. How has man enabled the soil to produce its effect? Explain how these areas illustrate the fact that the effect of temperature, humidity, and sunshine is always interwoven with that of soil and cultivation in determining the productivity of the land?

4. In the list of mineral products in Table 25, what fertilizer do you find? Show where it is produced by inserting on a map of the world the values as indicated by the following symbols: No. 1, ▬ 200 thousand tons, No. 2, ■ 100, No. 3, ▲ 40, No. 4, ○ 10 or less. How far is this fertilizer found in densely populated agricultural countries that have great need of it? What three countries are best supplied in proportion to their needs?

5. Look up nitrate of soda in the encyclopedia or other reference book and find how large a percentage of the supply comes from a single country. Since nitrogen can profitably be taken from the air where electric power is cheaply available, what parts of the United States are likely to supply their own needs for nitrogen fertilizers?

6. Look up potash in the encyclopedia and find what regions have been the great producers of potash in the past and how great is their supply. In 1920 the chief production of potash salts in tons was as follows: Germany, 11,386,000; France, 1,061,000; Nebraska, salt lakes, 84,000; California, salt lakes, 43,000; Utah, salt lakes, 41,000; remainder of United States from molasses, cement-mill dust, kelp, and all other sources, 17,000, and Abyssinia, 10,000 (estimated). What do you conclude as to the extent to which potash is available near the world's important agricultural regions?

7. What do exercises 4, 5, and 6 show as to the availability of phosphates, nitrates, and potash, and as to the probability that in the future the farmers of the world will have difficulty in getting enough. As to which are the prospects most hopeful?

8. In Table 13, Col. J, shows the estimated productivity of different countries, that is, the relative amounts of crops of all kinds that an acre produces in each country, as estimated by the United States Department of Agriculture. Insert the figures for productivity on an outline map of the world, and shade the countries for which data are available in four grades as follows: (*a*) over 130, (*b*) 101 to 130, (*c*) 70 to 100, (*d*) less than 70. Compare the productivity in each of the following types of countries: (*A*) dry, long settled countries where the soil is naturally rich but has been much cultivated; (*B*) moist, new countries where the soil has not yet been

greatly exhausted by prolonged farming; (*C*) moist, long settled countries in middle latitudes where the soil is naturally more or less leached by abundant rain, although in some cases renewed by glaciation; (*D*) moist, tropical countries where the soil is much leached. So far as natural soil fertility is concerned these regions would rank as here given. In what respects and why do they depart from this order in actual productivity?

CHAPTER V

THE VARYING CAPACITY OF RACES

Examples of Man's Varying Capacity.—The part played by a country in business depends on the character of the people far more than on their number or the natural resources. India has about forty times as many inhabitants as Canada and the natural resources, especially those depending on plants, are probably greater, but India's foreign commerce is only about one and one-half times that of Canada. In other words, in this respect one person in Canada is nearly thirty times as important as one in India. In internal business the ratio is probably about the same.

Compare the islands shown in the following table. The main resources of all depend largely on vegetation and on the sea. New Guinea, because of its abundant rain and high temperature at all seasons, probably has the greatest possibilities, but is closely rivaled by Formosa and Hawaii; next comes New Zealand with much smaller possibilities because of a winter when plants grow but little; then Cyprus hampered by dry summers, and finally cool Iceland, where the possibilities are meager. The approximate part played by the average inhabitant of each island in foreign commerce and probably in business of all kinds appears in the first column of the table. While no exact data as to the relative possibilities of production are available, a study of the soil and climate leads to the rough estimate in the second column. The order of the islands in the two columns is quite different.

Island.	Approximate Exports per Person in Dollars, 1920.	Estimated Relative Value of Possible Products per Square Mile.
New Guinea	5	12
Formosa	10	11
Hawaii	400	10
New Zealand	200	5
Cyprus	20	3
Iceland	100	2

New Guinea and Formosa are extremely rich, but their people are relatively dull, inert, and poorly trained. Hence they produce little except their own monotonous food and scanty clothing. The native Hawaiians appear to be somewhat more capable and energetic than the New Guineans, but this does not explain the fact that in spite of Hawaii's smaller resources, the international commerce per person is eighty times as great as in New Guinea. The explanation lies largely in the fact that over 20,000 Americans, as well as many Japanese and other fairly energetic races, now live in Hawaii. The Americans who are descended from the old missionary families, and the best of the business men who have come more recently to Hawaii form a group of remarkably able people. The New Zealanders likewise are of fine English stock; their climate with its almost ideal temperature and fairly numerous but not severe storms is one of the best for man. But the climate does not favor such a rich growth of vegetation as in the three islands nearer the equator, and the vast distance of New Zealand from other progressive regions is a serious handicap. Thus in view of its smaller possibilities the actual achievements of New Zealand rival or perhaps surpass those of Hawaii. Cyprus, on the contrary, falls much below what might be expected in view of its agricultural possibilities and its position near Europe, Africa, and Asia. Its people are not efficient.

Iceland presents an extraordinary example of the importance of inheritance compared with resources. Iceland is so cold that almost no grain is raised; valuable minerals are almost lacking; and the people depend upon three somewhat primitive industries, cattle raising, fishing, and especially sheep raising. Yet the relative importance of the average Icelander in the world's business is half as great as that of the New Zealander. This suggests that in view of the small resources of his island, the Icelander works more efficiently than either the New Zealander or the Hawaiian. The explanation of the high Icelandic standard probably lies partly in the fact that the climate stimulates health and activity, but probably more in racial inheritance. Iceland, far more than any other region in this list, was settled by emigrants who were largely picked from the best people of a country and have not since been mixed with others of less ability. Many of the Icelandic settlers belonged to the most able Norwegian families a thousand or more years ago. Those families were leaders because they had ability. Their descendants today, like those of the missionaries in Hawaii and of the religious colonies of early New Zealand, are extremely competent people, able to make the most of the available resources, and to carry on a relatively large and profitable business in a place where people of less ability would starve, or degenerate. If the Icelanders had no greater ability than the New Guineans, the amount of business might be no greater than in New Guinea. Instead of producing great men, like the sculptor Thorwaldsen, in larger numbers in proportion to the population than almost any other country, they might never have been heard from.

The Three Conditions that Determine People's Ability.—The preceding comparisons illustrate the fact that the importance of a region depends on the ability of the people no less and perhaps more than upon any other single factor. If the three hundred million people of India were as able and energetic as the ninety thousand of Iceland, India might dominate the world. Three main conditions determine people's ability: (1) race and inheritance; (2) health and energy; (3) training and social environment. Some people think that one of these is the most important, and some another. All are important and it would be a waste of time to try to show which is more so. Each plays its own special part: inheritance determines the kind of abilities which a nation possesses; health determines whether those abilities are used effectively or weakly; and training determines the direction in which the abilities are applied. A nation may be compared with a knife. Inheritance determines the quality of the steel, so to speak; health determines whether the blade is sharp or dull; and training whether the knife is used skillfully or unskillfully. The first thing is to choose a knife with good steel and a man with a good inheritance; the next is to see that the knife is sharp and the man in good health; and the third is to learn to use the knife and to teach the man how to work effectively.

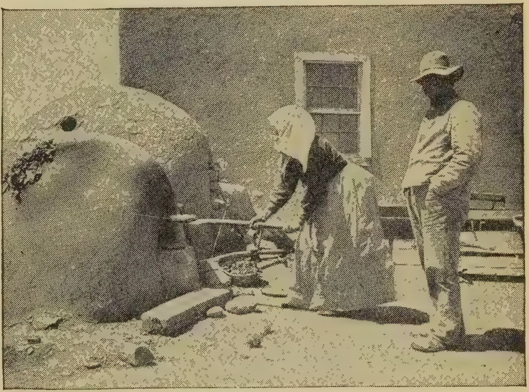


FIG. 16.—Mexicans Baking Bread in a Mud Oven.

Crude methods of work, and idleness among the men are common among Mexicans of the lower classes who are largely of the Indian race.

In this chapter we shall look more deeply into the great question of inheritance and racial traits, while in the next we shall find out how closely geographical conditions are related to health and energy. We shall not discuss education and training, for they are geographical only as they depend on inheritance and health. The fact that this book has been written for the purpose of training bright minds shows the great importance attached by the authors to education.

The relation of inheritance, health, and training may be illustrated by a few comparisons. The native Australians inherit such poor minds that no matter how strong and healthy they may be it seems impossible to train them to take an important part in the world's work. Even as laborers they are ineffective because, although they can become skillful with their hands, they lack sufficient power of concentration to plan carefully or to work steadily. Their interests flit from object to object. If a problem involves many ideas they can rarely or never think it through to its logical conclusion. The Dutch have a much better inheritance than the native Australians both mentally and physically. But suppose they settle where the hookworm, malaria, and other diseases keep them ill most of the time. They may be more competent than native Australians would be, but they cannot accomplish much, for what little energy remains to them must largely be devoted to looking after their bodily health. In the same way, if people who have no training undertake to run a copper mine or a woolen factory they produce little. The Bolshevists in Russia discovered this when untrained men tried to run the factories, railroads, and government. The Bolshevist régime could maintain itself only by calling many of the trained men back to their old work.

How Racial Inheritance Makes Itself Evident.—The inheritance of a race is a geographical matter because environment selects certain types for preservation. The Norwegians are hardy in part because only hardy people can survive in their rugged land and stormy climate; the Arabs are slender partly because stout people tend to die in the heat of the desert. The Beduin Arabs or nomads are also poor laborers. This is largely because there is little call for steady labor in their wandering lives. The man of the desert who is most likely to succeed and to be able to take care of his children is the one who is able to make a swift hard dash into the desert after stray camels or on a plundering raid, and to go days without food and with only a few swallows of water. So natural selection has chosen that type for preservation, and the Beduin Arab is therefore quicker, more alert, more able to endure hardship, and less able to carry on steady work or to engage in trade than the Arabs of the towns in the oases.

The effect of inheritance is very evident in the differences in the people around us. Even among brothers and sisters one may be inventive, another musical and a third hopelessly dull. Among races the differences are similar, although not so extreme. These differences appear not only in complexion, hair, eyes, features, and stature, but in mental ability. It was long supposed that the minds of young children of all races are alike, and that the differences which are so evident in later life arise from training and health. Now it is known that both individuals and races differ in their mental quite as much as in their physical inheritance. One of the strongest evidences of this is psychological tests such as were made on a large scale during the Great War when hundreds of thousands of soldiers were tested all over the United States. The tests showed that the average mental ability of the grown men of the United States is scarcely greater than that of a bright child of about 13 years. Less than half the people in the United States have sufficient ability really to utilize the education offered by the elementary schools, and not over 12 per cent belong to the superior type that is really able to benefit fully by college training. Hence, almost every business employs some people who are not mentally competent for their work. The result is an enormous amount of poor work and a vast number of cases where men take a job only to be discharged or to quit work, so that the labor turnover, as it is called, is enormous. Another result is inefficiency and extravagance in government. People who have poor minds can easily be persuaded to vote for bad men or deceived into thinking that useful reforms will take away their liberty.

The two chief reasons why the mental condition of the people of the United States is not higher are a poor inheritance and poor health. Training does not enter into the matter, for we are now talking merely of people's capacity to *receive* training. Geographically the question of inheritance turns on the differing capacities and birthrates of people from various countries. In the following table the numbers represent the I.Q. or "intelligence quotient" of school children in a typical American city. A high figure means a high degree of mental ability. Anyone with an intelligence quotient above 100 may be counted as a valuable asset to society and to business. If the quotient is below 100, something is wrong. The person might be highly valuable, if poor health, malnutrition or some preventable cause were not responsible for his mental weakness. But society would be much better off if the cause could be discovered and removed.

1. Children of professional classes	125
2. Children of semi-professional and business people	118
3. Children of skilled laborers	107
4. Children of semi-skilled and unskilled laborers	92

Among these four groups the first two are largely the descendants of North European ancestors. Among such people the families are small, averaging only two or three children. The third group, though largely of North European origin, is derived partly from southern and eastern Europe. Its families have on an average perhaps three or four children. The fourth group is descended largely from relatively recent immigrants from southern and eastern Europe. Its families average perhaps five or six children. Even when allowance is made for the lower deathrate of the higher groups, many people think that the number of people in the United States with high ability is actually diminishing, while the number with low intelligence is increasing rapidly. Fortunately, this is a relatively new tendency and can be checked, but if it continues several generations the United States may retrograde in business and in all lines where high mentality is required.

This same dangerous tendency is illustrated by the intelligence quotients of the different races in an American city.

1. Americans	106	4. Portuguese	84
2. North Europeans	105	5. Colored	82
3. Italians	84	6. Spanish	78

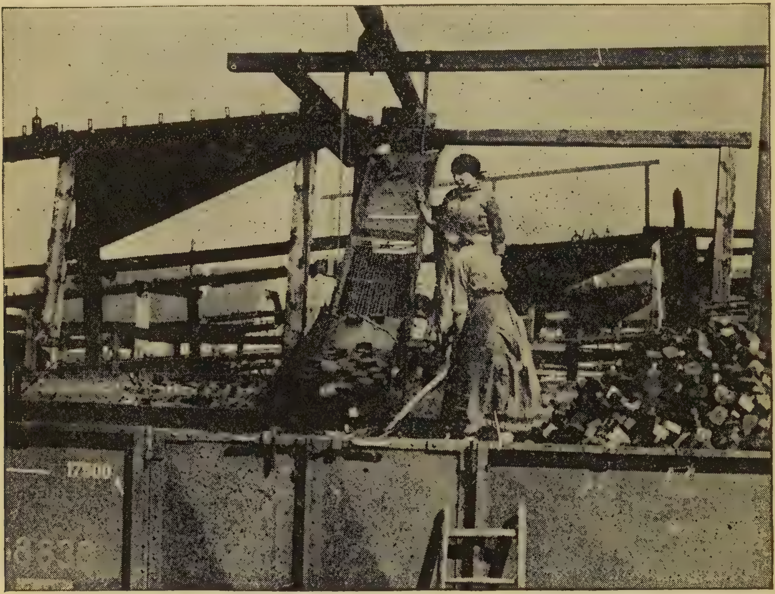
The matter may be put in still another way. The United States Army tests divided the soldiers into five grades: *A*, very superior; *B*, superior; *C*, average; *D*, inferior, and *E*, deficient. The percentages in these grades among some of the various races making up the population of the United States were as follows:

Kind of People.	*A* and *B*. Superior.	*C*. Average.	*D* and *E*. Inferior.
English	19½	72	8½
Dutch	11	70	19
All white men	12	64	24
Russians	3	37	60
Italians	1	36	63
Poles	½	29½	70
Colored men	½	20½	79

These tables do not mean that all Spaniards, Poles, Portuguese, Italians, and people from Russia, for example, are of low intelligence and inferior value. They merely mean that recently the immigrants from those countries have included only a few of the best citizens and many who were not particularly successful or useful at home. By bringing slaves from Africa our ancestors doubtless added to our population a few persons of high ability, but they certainly added a great number whose average mental capacity differs from that of the average white American about as much as the ordinary unskilled laborer differs from the average clerk, or as the clerk differs from the physician or lawyer. Such people lower our standards as a nation, and if they have large families they have a tendency to retard civilization and may cause a collapse. Of course some members of every race are highly valuable. Many colored men, as well as the better people of Spain, Italy and other countries, are much more valuable than the average white American. If a person of any race has reached the point where he can read and understand a book like this, he has almost certainly inherited much more than the average ability, and his descendants are likely to be much more intelligent and valuable than the average person no matter what his race. The world's greatest effort should be to increase the number of such people in proportion to those who are stupid and inefficient. Nothing will insure the stability and prosperity of a business like having a force composed of people whose mental inheritance is of high quality.

The Races of the United States.—The chief races which make up the American people today are (1) Nordic, (2) Mediterranean, (3) Alpine, (4) Jewish, and (5) Negro. In each race the differences between the best and the worst individuals are enormously greater than between the races, when all the members of the race are averaged together. Moreover, the three European races, Nordic, Mediterranean, and Alpine, are so mixed even in Europe that truly typical examples are far less common than are persons who combine the physical and mental qualities of several races. Nevertheless it is worth while to try to describe a few of the main qualities of each. Pure-blooded examples of Jews and Negroes, on the other hand, are so numerous that the keen, persistent, economical and businesslike qualities of the Jews and the good-natured, indolent, unthrifty, and unbusinesslike habits of the Negroes are well known. Yet even in those races much mixture has taken place. In the northern states, for example, pure-blooded Negroes are rarely seen.

The Nordics are the tall, fair-haired, blue-eyed, long-headed people of northern Europe, including Scandinavia, most of Great Britain, Holland and northern Germany. Mixed with other races they are found more or less in northeastern Ireland, Belgium, northern France, southern Germany, Switzerland, northern Italy, and even Spain. Some of the Nordic qualities which are especially important in business may be summed up as follows: (1) Curiosity, which someone has called "the mother of philosophy and science." Many people believe that this is why modern science is largely a product of northwestern Europe. Among the famous men of each country who are mentioned in the Encyclopedia Brittanica, Sweden, Norway, and Scotland have a peculiarly large number of scientists, England excels in inventors, and Germany in philosophers. (2) Nordics are less sociable than most races. This makes them reserved and stiff, and to that extent not easy to do business with. But it also makes them willing to go far away and live by themselves. Hence, they make good colonists in new lands. Also if they go to foreign countries they are apt to stay by themselves and keep up their own methods of life and of business. That is one reason why the British communities in tropical countries are so great a force in business. (3) Again the Nordics are adventurous. This adds to their qualifications as colonists. It also causes them to be pioneers in business. Many other qualities such as self-reliance, readiness to assume responsibility, dependability, and persistence are commonly ascribed to the Nordics by their admirers. The remark of a colored soldier to his Nordic companion from Vermont illustrates something of the contrast between the two races: " When you Yankees has a trouble you sits down and thinks and thinks. When we has a trouble we sits down and goes to sleep."



Keystone View Company.

Fig. 17.—Loading Coal Briquettes near Nieder Lausitz, Germany.

Industry and thrift are characteristic of the German people and of their industries.

The Mediterranean race comprises the short, black-haired, darkeyed, long-headed people of Greece, south Italy, Portugal, much of France and Spain, and the western and more isolated parts of Great Britain and Ireland. The Mediterranean people are characteristically sociable and friendly. That may be one reason why the Italians have so many clubs, while the Irishman makes an excellent foreman. They are not so full of curiosity or so given to deep thought and self-repression as are the Nordics. They are guided more by their feelings, and are on the whole more easily led and more excitable. These qualities may help to explain why among the eminent men in the Encyclopedia Britannica the French are especially strong in military leaders, the Irish in military and political leaders, and the Italians in art, while the Spaniards in proportion to the number of their great men are fairly strong in all these branches and in literature, but weak in history, science, philosophy, and religion. In fact, aside from the Irish, who are average, every European country where the amount of Mediterranean blood is large is relatively weak in religious leaders, while Switzerland, Scotland, England, and Germany are religiously strong in the order named.

The Alpine race is intermediate between the Nordics and Mediterraneans both in geographical position and character. It includes primarily the stocky, brown-haired, hazel-eyed, broad-headed people of the central mountains of Europe especially in Austria, Switzerland, southern Germany, Czechoslovakia, and central France. With these are also often included the Slavs of the Russian countries, Bulgaria, and Serbia. One of their chief characteristics is great steadiness. They lack the adventurous quality and the inventiveness of the Nordics and the artistic fervor of the Mediterraneans. But they are admirable in their capacity for sticking to details. This may be one reason why although Switzerland has not been the home of many great inventors it has had an extraordinary number of good scientists in proportion to its population. The Alpine race also seems to be even more ready than the Mediterranean to accept the leadership of a few dominant spirits. South Germany is largely Alpine while even in northern Germany there is Alpine blood. Many people think that these qualities help to explain why the great mass of Germans submitted so absolutely to their leaders during the Great War. They not only believed all that was told them by their Nordic leaders, chiefly Prussians, but obeyed unhesitatingly when told to do things that they disapproved. In business the same spirit is one reason why the Germans talk continually about the "System." When a system has been laid out by a leader the rank and file follow it without question. This attitude prevents the ordinary man from going out and doing much for himself, but it helps Germany to organize all her energies for one particular purpose, and is a strong factor in Germany's business methods.

This brief sketch of the chief races which inhabit the United States shows that each race has certain qualities which are of the greatest value not only in business but to civilization. Nordics are in general the leaders, but by no means exclusively. One of the greatest needs of the United States and of the world is to find out just what qualities are really the inheritance of different kinds of people, and then to take measures to increase the number of people who are born with those desirable qualities.

EXERCISES AND PROBLEMS

1. Study the distribution of native whites in the United States. Insert the figures from Col. G, Table 2, on an outline map of the United States. Draw isopleths at 60, 70, and 80. Shade so that the areas with more than 80 per cent are darkest and those with less than 60 lightest. Why is the percentage of native born whites largest in the interior? How does this map help to explain the fact that the strongest opposition to treaties of alliance with other countries or to the United States taking a share in European affairs comes from the agricultural regions in the interior of the United States?

2. The distribution of foreign-born immigrants. Draw a similar map of the percentage of foreign-born whites based on Col. H, Table 2, with isopleths at 5, 10, 15, 20, and 25. What effect upon the percentage of foreign-born whites is produced by each of the following conditions: (*a*) nearness to the coast, (*b*) manufacturing, (*c*) nearness to Canada, (*d*) the presence of colored people? Write out your conclusions as to where immigrants go and why.

3. The distribution of colored people. Make a similar isopleth map of the percentage of negroes from Col. I, Table 2. Draw ispoleths at 5, 15, 25, 35, and shade in the usual way. What degrees of latitude and longitude border the area where the colored people form at least a third of the population? Beyond that area in what direction does the number of colored people diminish most gradually? Explain the historical and economic causes of this. Compare this map with the map of the preceding exercise. How do they explain one another? What is the largest percentage of foreign-born whites in any state where the colored population numbers more than 25 per cent? Are there any other states where the percentage of foreign-born whites falls equally low?

4. On the basis of Col. G, Table 16, draw a map of the production of cotton. Shade heavily all the states that produce more than 400 bales of cotton, and lightly those producing a smaller amount. How closely does this map agree with the map of colored people? Explain the scarcity of colored people in one important cotton region which lies in two states on either side of a great river.

5. Study the distribution of special races of immigrants in the United States. Select three of the regions from which immigrants come to America, as shown in Table 3, one being a country bordering the North Sea, another some other European country, and a third a non-European country. On isopleth maps of the United States, with isopleths at 10, 20, 30, and 40, show the number of persons from each country per thousand persons in the various states. Shade as usual. Compare the number and distribution of the immigrants of the three races you have chosen.

Show why they are found in certain parts of the country. So far as possible point out their relation to (*a*) the sea coast, (*b*) international boundaries, (*c*) manufacturing, (*d*) agriculture, (*e*) the climate of the countries from which they came.

6. Let certain members of the class make large wall maps showing the distribution of each of the types of foreign born whites in Table 3, and of the negroes from Col. I, Table 2. Where there are a given number of foreign born whites per thousand population, let the shading in all maps be of the same density. Hang these maps on the wall and compare them. Discuss the relative numbers of different races in each region indicated in Table 2, that is, New England, Middle Atlantic states, etc. Discuss this especially in relation to your own state. Try to find out in what industries the different types of immigrants in your own state are employed.

7. Rate of increase among different parts of population of United States. Col. D, E, and F, Table 48, show the vital index of native whites, foreign born whites, and colored people in 1917. Other years are practically the same. The vital index means the number of births for a hundred deaths. It shows whether a given type of population is increasing or decreasing. Make maps of the United States showing the vital index for each column. Shade in yellow the states where the index is less than 100, that is, the states in which the population of the given type is decreasing. Shade in brown or red the states with an index between one and two hundred, that is, the states where the given type of population is holding its own but not increasing rapidly. Shade in blue the states with an index over 200 where the population is increasing rapidly. For each of the three groups of people define the parts of the United States where they are (*a*) decreasing, (*b*) holding their own, (*c*) increasing rapidly.

Compare your three maps with the maps made in the preceding exercises showing where each race is found in greatest abundance. Do the different types of people seem to increase fastest where they form a large or a small proportion of the population? If the present tendencies persist what sort of people will be dominant in each of the following regions: (*a*) New England and the Middle Atlantic states, (*b*) the southern states; (*c*) states from Ohio westward? What do the maps indicate as to the probable future of the colored race?

CHAPTER VI

THE RELATION OF HEALTH TO BUSINESS CAPACITY

How Health is Related to Business.—Just as the dullness of a knife may make the best steel and the most skilled hand unable to do a good piece of work, so poor health and lack of energy may spoil the efficiency and judgment of people who have the best inheritance and the best education.

Health depends on inheritance, climate, food, clothing, shelter, occupation, mode of life, the virulence of bacteria and other parasites, the conditions of medical practice and sanitation, and various other factors. Every person is apparently born with the capacity to live a certain length of time provided there are no accidents such as disease. Those with poor physiques may have the capacity to live only ten years; some have energy enough for fifty years, and a few for a hundred. Other things being equal, the person with health and energy is the most useful in business and in almost every other way. Not only can he accomplish more than the weak, sickly person, but his judgment is usually better.

Effect of the Seasons on Man's Health and Energy.—Let us see how health varies from season to season and from place to place. The deathrate is the most easily available approximate measure of the general health of a community, while the rate at which people carry on their daily work is an excellent measure of their energy. Fig. 18 shows how these two conditions varied in Connecticut and Pennsylvania during the four years from 1910 to 1913. The lower curves show the deathrate in Connecticut (*C*) and Pennsylvania (*D*), but the curve is inverted so that good conditions of health are indicated by high parts and poor health by depressions. The two upper curves show how the average hourly earnings of piece workers in three Connecticut factories (*A*) and in a huge Pittsburgh factory (*B*) varied during the same period.

In January, 1910, people's energy fell off very badly, as appears in curves *A* and *B*. Those who were at work in the factories had the chance to work as fast as at any other time, but though they were not sick, they did not feel like it. In other words their energy and hence their capacity to work and their value in business were low. At the same time many became ill so that during the next two months the deathrate was very high, as is indicated by the low level of curves *C* and *D*. During the spring of 1910 both health and energy increased rapidly and reached a high point in May and June. When the summer heat came on it was great enough to diminish the energy of the factory workers materially so that curves *A* and *B* show a sag. Ill health also increased somewhat so that curves *C* and *D* become flat and sag a little, but not seriously. If children under two years were included the health of this and of all other summers would appear much worse than in Fig. 18, but little children are omitted because we are now dealing with the people who take part in the world's work or are at least actively preparing for it.

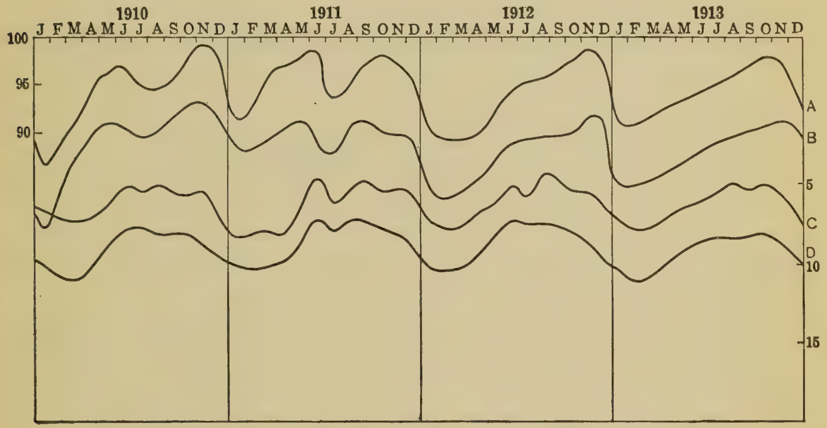


FIG. 18.—Seasonal Variations in Health and Energy in Connecticut and Pennsylvania.

Work of factory operatives in (*A*) Connecticut and (*B*) Pennsylvania; health (death rate inverted) in (*C*) Connecticut and (*D*) Pennsylvania. Scale for (*A*) on left and (*C*) on right. (*B*) and (*D*) are placed below the others for convenience, although really belonging at essentially the same level.

Follow the four curves of Fig. 18 through the four years. Notice that without exception they are low each winter. In the summer of 1911 which was extremely hot and trying, especially in New England they all show a dip, while in the summers of 1912, and especially 1913, when the hot spells were short and well separated, the heat had almost no effect. In the late autumn the curves for health drop sooner than those for energy, which seems to mean that the approach of cold weather at first stimulates people who are in good health while those who are feeble feel the effect of the low temperature more promptly.

In winter, however, a drop in energy is regularly followed by a long period of poor health.

The fact that aside from minor fluctuations due to local accidents the four curves go up and down so closely together seems to mean that all four are subject to the same influences. The four factories were engaged in quite different kinds of work, and there were no strikes, labor troubles or shut downs in either. The cities of Connecticut are nearly 400 miles from Pittsburgh, and are subject to quite different influences in many respects. There were no epidemics of any importance to cause the curves of health to go up and down together and the agreement would be equally great if all contagious diseases had been omitted. The only factor which seems competent to explain the curves and which varies in approximately though not exactly the same way in both places is the seasons and the general character of the weather. Hence, aside from occasional epidemics, the weather appears to have been the chief cause of variations in both health and energy. Records of deaths and of factory work in more southerly states including the Carolinas, Georgia, and Florida suggest that there too the same is true but with distinct differences. The winter in the South is less harmful than in the North, while the long hot summers have a correspondingly bad effect upon both health and energy.

These variations in health and energy have an important relation to business. During the 24 worst months of the four years shown in Fig. 18, 25 per cent more people died in both Connecticut and Pennsylvania than during the 24 best months. In other words, if the climatic conditions of the worst 24 months, together with their indirect effects through food, clothing, indoor air, and diseases, could have been neutralized, the number of deaths each year would have been diminished by about 2000 in Connecticut and 12,000 in Pennsylvania. In the United States as a whole there are about 1,400,000 deaths each year. At the rate determined in Connecticut and Pennsylvania, there would be about 150,000 fewer deaths each year if by proper care the worst half of the months could be made as good as the best half. Every person who dies while his work is still of value represents an irreplaceable loss. In the factories the difference between the better and the worse halves of the months shown in Fig. 18 amounts to about 4 per cent, but would be far greater if people did not feel obliged to work in spite of their feelings. Yet even at this rate, if we suppose each of the gainfully employed workers in the United States to be worth two dollars a day and to work 250 days per year, the country would gain about $400,000,000 if people worked as well in the worse half of the year as in the better. The effect of the seasons on mental work appears to be much the same as upon physical work, except that people's minds apparently work best at a somewhat lower temperature than their bodies. Thus, each year the variations of the weather appear to cause a loss of hundreds of millions of dollars from deaths and poor work, in addition to all the loss due to sickness, and to the interruption of the work of others which sickness and death always cause. So important is this matter that many factories employ doctors and nurses, and provide recreation grounds and hygienic lunch rooms in order to improve the health and energy of the operatives.

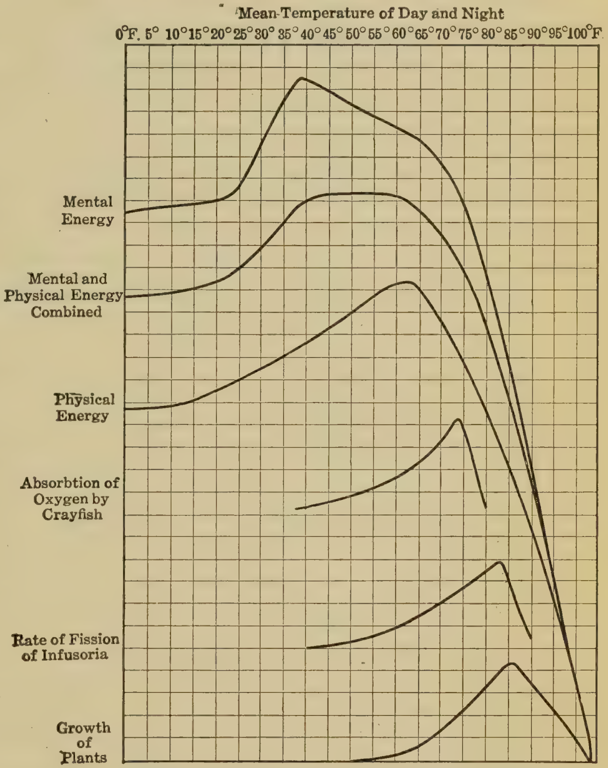


FIG. 19.—Mean Temperature and Vital Processes in Plants, Animals, and Man.

Effect of Temperature on Man's Mind and Body.—Let us now see what particular conditions of climate cause the variations from season to season. Fig. 19 shows the effect of temperature alone, without respect to other conditions or to the season at which a given temperature happens to occur. The upper curve shows that in the investigations thus far made, when the *average* temperature out-of-doors for day and night together was low, the marks of a large group of students were also low, which means that their minds were inactive. When the average temperature rose about to freezing, the marks began to improve. When the outdoor temperature averaged 40°, that is when it rose to perhaps 50° by day and there were light frosts at night, mentality seemed to be at its best, while at high temperatures the mind became less active. The third curve in Fig. 19 shows variations in health as determined from the deaths of millions of people and from records of illness. Here, just as in the mental curve, the ability is relatively slight on cold days, but increases with rising temperature until the highest point is reached at about 64°, that is, when the thermometer rises to about 70° or more at noon and falls to 55° or so at night. Thus there seem to be indications of a mental optimum at an average outdoor temperature of about 40° and a physical optimum at about 64°. Since man's total ability depends upon the combination of mental and physical activity, his general capacity for work probably varies according to the second curve in Fig. 19, which is a combination of the two upper curves, mental and physical, giving equal weight to each.

The other curves suggest that man is much like other forms of life. One curve shows the amount of carbon dioxide liberated by the cray-fish at different temperatures. This is a measure of the animal's activity. At temperatures a little above freezing the life processes of this cold-blooded animal practically cease. With warmer conditions its activity rises steadily to a maximum not far from 75° and then falls off rapidly. In the much lower form of life shown by the infusoria curve the rate at which the cells divide varies in the same way as the activity of the cray-fish, except that the optimum is a little higher. The same is true of plants whose optimum in most cases is highest of all. Fig. 19 illustrates the fact that among all living beings the same great law of optimum temperature apparently prevails. Man boasts that he is superior to nature, but each advance in knowledge shows more conclusively than before that he is governed by the same laws which govern the rest of creation. The only difference is that man has the power to overcome part of his limitations.

The Effect of Atmospheric Moisture.—Among the climatic elements other than temperature, people often suppose that the barometric pressure is highly important, but except at high altitudes it is now generally agreed to be important chiefly because of its effect upon variations in temperature and humidity.

It is hard to separate the effects of humidity from those of temperature. In general the investigations thus far made suggest that people work best with high humidity in winter, while in the spring a relative humidity of about 75 per cent and in summer about 65 per cent appears best. This seems to indicate that it is not the *relative* humidity but the absolute humidity which counts. Most people work best when the air contains 4 or 5 grains of moisture per cubic foot of space. At a temperature of 80° an absolute humidity of 5 grains means a relative humidity of 45 per cent; at 64° about 70 per cent; and at 56° about 100 per cent. If the air is colder than 56° it cannot hold as much as 5 grains per cubic foot. Apparently this is an important reason why health and efficiency fall off so badly in winter even though we protect ourselves from the oustide air by means of heated houses. Within our houses the winter air is often extraordinarily dry. This not only parches the mucous membrane and leads to colds, but makes people sensitive to drafts. In the autumn we sit in a temperature of 65° and feel comfortable. As soon as the rooms are heated, however, many people feel chilly if the thermometer falls below 70°. The extreme dryness causes rapid evaporation from the skin and that makes us cool even though the temperature is higher than is good for health. If people would live in cool and properly humidified but not damp rooms not only would they probably soon find themselves comfortable but their health, work, and pocketbooks would presumably be better off.

The Benefit of Variability.—Another climatic condition which may have an effect upon health and business is illustrated by two sentences from the sporting page of a morning paper: "With a marked change in the weather the men of the university football team showed more spirit than they have displayed all the week." "A touch of winter in the air made the football practice a little snappier this afternoon." The two reporters who wrote these words touched on something which we all know, but whose importance is perhaps greater than we realize. When today's temperature is the same as yesterday's, people tend to work slowly, while if there is a change they work faster. Of course the change may be too extreme, but that occurs only occasionally. In three Connecticut factories a rise in temperature, taking the year as a whole, was slightly stimulative, while a drop of from four to ten degrees causes people to work faster than at any other time. This means that each of the storms which pass over us probably gives a distinct impetus and makes us work faster. Fig. 20 shows the average effect of clear and cloudy days on 300 factory operatives during a year in Connecticut, regardless of temperature. Most people think that they work fastest on a bright clear day after a storm, but these hundreds of factory operatives did not

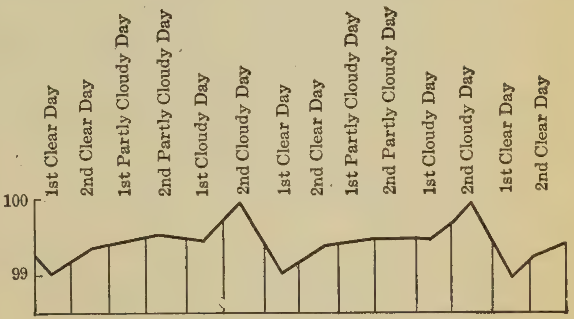


FIG. 20.—Effect of Changes of Weather.

do so. The people whose work is illustrated in Fig. 20 worked most slowly on the first clear day. Their work increased a trifle on the next clear day, and on the partly cloudy days, and was highest at the end of a storm. The first cloudy day was not favorable, but the second cloudy day when rain perhaps fell in the morning and the sky began to clear in the afternoon was the time when they were most efficient. Fig. 20 suggests that the passage of each successive storm spurred them to greater activity. We are prone to complain of the weather, but frequent storms and the consequent changes of temperature are perhaps one reason for the energy of the United States.

The preceding pages, especially Fig. 18, suggest that there is a difference in people's capacity for business from season to season. In the northern United States as a whole the best conditions seem to prevail from about the middle of April to the middle of June and again from mid-September to mid-November. Therefore if extra work is needed, or if some specially difficult task is to be done, it might well be undertaken when people can think most clearly and work most accurately and rapidly. Midsummer, as everyone recognizes, is not the time for extra work, but midwinter is perhaps equally unsuitable. The common practice of closing the books in January may not be so sensible or so economical and accurate as it would be to close them about the first of October or of April, for it involves unusually hard, careful work.

The Distribution of Health and Energy in the United States.—Having seen how health and business efficiency vary from season to season, let us see how they vary from place to place. The distribution of health in the United States is shown in Fig. 21 which is based on the mortality statistics of three large life insurance companies. This is better than using the mortality statistics compiled by the United States Census because the census figures are greatly influenced by differences in the race and occupation of the people of different sections, and by the relative number of children and old people. The life insurance statistics make allowance for differences in age. Moreover, when the map was prepared, each company insured about the same kind of people in all parts of the country, so that the number of deaths compared with the number of people who are insured gives a good measure of the general conditions of health. The map shows that the best health is in the northeastern quarter or more of the country and on the Pacific coast. The prairie states of Nebraska and Iowa stand highest. Much of their advantage is due to the fact that so large a proportion of the people who are insured are prosperous farmers who live outside the big cities, and therefore breathe pure air, and are not under the nervous strain of active city life. From the healthful region of the northeast there is a rapid decline southward so that the deathrate in the southern tier of states is 30 to 50 per cent higher than in those of the North. A noteworthy feature of the map is an area of poor health running north into Nevada, and a band of relatively poor health across the entire Rocky Mountain region.

The Relation of Health to Achievement.—Where people's health is good their energy is usually high. This would be expected to have an important influence upon all sorts of conditions including business.

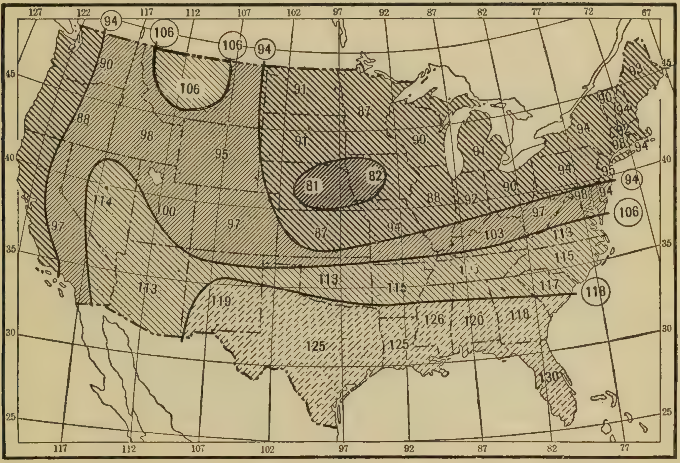


Fig. 21.—Distribution of Health in the United States According to Life Insurance Statistics.

Fig. 22 shows the opinion of 23 leading geographers, ethnologists and others, as to the relative rank of the states in all kinds of progress. The 23 men classified the states according to the following definition of civilization, which is also a statement of the best conditions for business: Civilization means those characteristics which are generally recognized as of the highest value. It depends on "the power of initiative, the capacity for formulating new ideas and for carrying them into effect, the power of self-control, high standards of honesty and morality, the power to lead and control other races, the capacity for disseminating ideas, and other similar qualities which will readily suggest themselves. These qualities find expression in high ideals, respect for law, inventiveness, ability to develop philosophical systems, stability and honesty of government, a highly developed system of education, the capacity to dominate the less civilized parts of the world, the ability to carry out far-reaching enterprises covering long periods of time and great areas of the earth's surface," and also the power to develop all that is best in literature, religion, and all the various forms of art.

On this basis the 23 men classified the states into six divisions according to the general ability and influence of the citizens, but without regard to the actual number of people. The map represents the opinion of a group of the most highly trained and best informed men in the country. Notice how closely it agrees with the map of health, Fig. 21. There is the same high area from New England to Kansas, a decline southward and westward, a tongue of low conditions extending up into Nevada and a high area on the Pacific coast. In other words initiative and capacity in business and various other lines appear to be at a maximum where health is best. This does not mean that people in the southern states or in other countries where the health is not so good have less real ability. Their inheritance is probably uninfluenced by environment. A man of unusual ability is as likely to be born in the South as in the North. In the North, however, if he lives in an equally wise way, he usually has more energy and hence is more easily able to accomplish great things. In the South he has to contend against greater obstacles and therefore is deserving of greater credit if he succeeds.

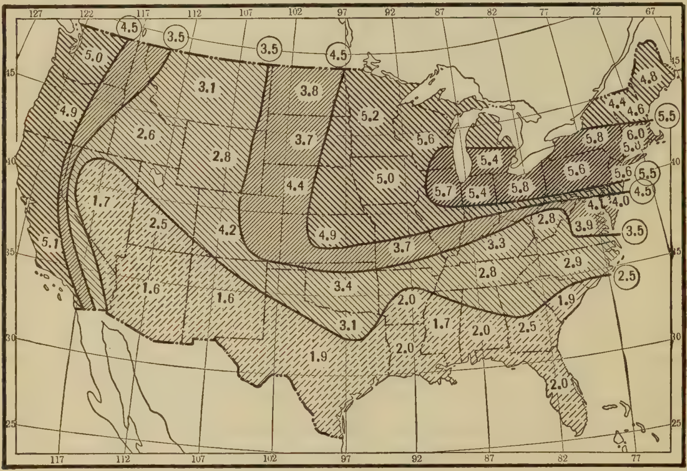


FIG. 22.—Distribution of General Progress in the United States.

Why Health and Energy Vary from Place to Place.—We saw on an earlier page that health depends on (1) inheritance, (2) food, (3) sanitation and medical practice, (4) climate, and (5) bacteria. We must now inquire how far each of these explains the variations in health from place to place. Inheritance doubtless plays a part, but not the main part, for in Fig. 22 it seems to have little effect. The people who are insured are of essentially the same kind in all parts of the United States, the vast majority being of North European descent. There is no reason to think that those in Iowa have any greater inheritance of energy than those in South Carolina. Food, sanitation, and medical practice are likewise highly important, although among the people who can afford to pay for life insurance practically all have a diet so varied that few deaths are due to mal-nutrition. The disadvantages due to the relatively poor medical care and sanitation in the South are partly offset by the nerve-racking life in the northern manufacturing cities. Moreover, these disadvantages are in themselves partly the result of lack of energy. Hence only part of the differences in Fig. 22 can be due to this group of causes.

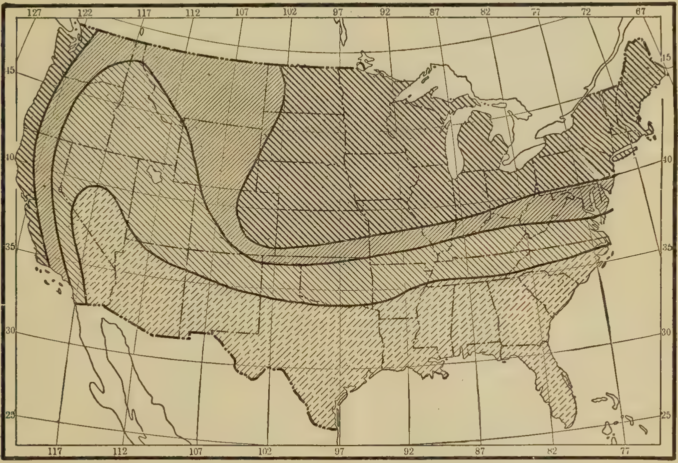


Fig. 23.—Distribution of Climatic Energy in the United States.

The effect produced by climate can best be measured by making a map showing the degree of energy that people would have in different parts of the United States if their health depended wholly on climate. Such a map, Fig. 23, shows that the best part of the United States is the northeastern quarter. Although the winters there are too cold and the summers often too hot, these disadvantages are partly compensated for by the variability of the weather and the stimulus that comes from the frequent days that approach the ideal at almost all seasons. The Pacific coast is likewise highly favorable. So far as temperature alone is concerned it is almost ideal in the sections close to the ocean, for days averaging below 40° or above 70° are almost unknown. The main disadvantage is probably the infrequency of changes. Notice how the climatic energy falls off in the southern United States. Note also the area of somewhat low energy extending toward Nevada and the relatively low band covering the whole Rocky Mountain area. Of course even the worst conditions in the United States are decidedly stimulating and healthful compared with tropical regions. For our present purpose, however, the important point is that the map of climatic energy is almost like that of health on the one hand and like that of civilization on the other. The three appear to be closely connected.

As to the relation between bacteria or other parasites and the distribution of health there can be no question. But the hookworm thrives only in relatively warm regions, and seems to be shorn of much of its influence if people are well nourished. The malarial bacteria may be transmitted to man wherever the anopheles mosquito thrives, but their ravages are serious chiefly in warm regions. The yellow fever bacteria are limited to warm regions where the stegomaria mosquito flourishes. Hundreds of other parasitic forms vary in virulence from place to place, and many of these variations are climatic. From all this it appears that inheritance, food, sanitation, medicine, and bacteria all have a great effect upon the geographical distribution of health and may cause variations from season to season. Moreover, epidemics, a new diet, the introduction of sanitary measures, and the discovery of new methods of eliminating bacteria are all capable of making great changes in the health and hence in the energy and business capacity of a region. Nevertheless, the effect of all these other factors is greatly influenced by climate and weather. The air, as it were, furnishes the background upon which the other factors play their part.

Climate, Health, and Civilization in Europe.—The relationships between health and other conditions which are indicated in the United States seem equally clear in Europe. Fig. 57 (Chap. XVII) represents the distribution of the climatic conditions which appear to give the greatest energy. Fig. 58 shows the distribution of health on the basis of the mortality statistics of the various countries of Europe. All the statistics have been reduced to what is known as a *standard* population, so that variations in the percentage of children and old people make no difference. It has been impossible to eliminate the effect of manufacturing and of crowding into cities. If this could be done it would make the manufacturing countries around the North Sea appear even more favored than now. Fig. 59 gives the distribution of civilization according to the opinion of fifty eminent authorities.

The significant feature of these maps is that all three are essentially the same. Notice how they shade off in every direction from the North Sea. Note also the three projections of good conditions toward Italy, the Black Sea, and the Baltic. Take away the titles and almost no one could tell which map is which. Such close similarity seems to mean a correspondingly close connection between climate, health and civilization. There is only one way in which this connection can be established. Health may be, and is, influenced largely by both climate and civilization. And good health undoubtedly tends toward the advancement of civilization. Climate also may perhaps have some direct effect upon civilization. But neither health nor civilization can have the slightest effect upon climate. Therefore climate seems to be the foundation; the general distribution of health is apparently due to climate; and the distribution of civilization appears to be greatly influenced by the health and energy of the people. A high civilization will, of course, react still further to improve the health of the people, but apparently it would not thus react to so great an extent unless the people already possessed energy because of their good climate.

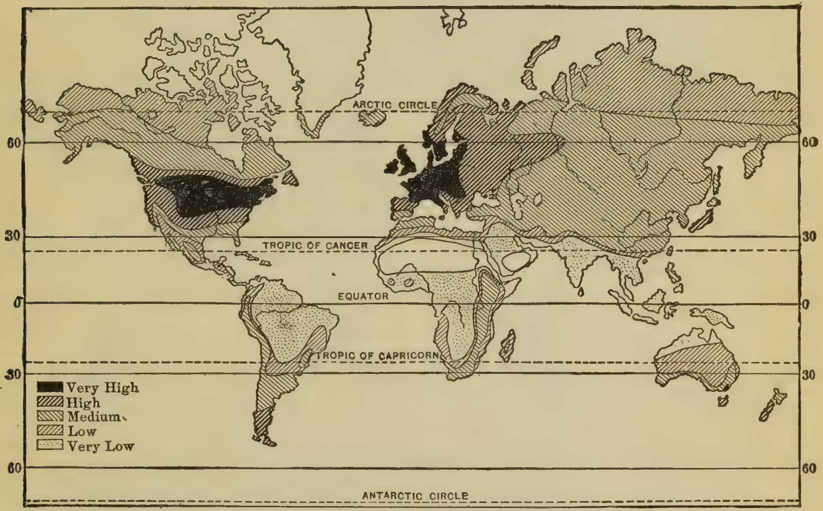


Fig. 24.—World Map of Climatic Energy.

The World Relationships of Climate and Health.—Let us carry the matter one step further. Figs. 24 and 25 are maps of the climatic energy and civilization of the world prepared in the same way as the corresponding maps of the United States and Europe. They resemble one another closely. Certain details are of course different, but much of the difference arises from the influence of Europeans, whose presence elevates such places as Egypt, India, and Java. Perhaps the most surprising thing about Fig. 24 is the way in which climatic energy declines from western Europe through Russia to Central Asia. It was long supposed that other things being equal, the climate would permit a man to be as capable in Central Asia as in Germany, but the climatic map suggests that this is not the case. From this point of view it is not surprising that the civilization of Central Asia is low. Farther East, on the other hand, climatic energy rises once more. It is comparatively high in Japan, and there we find the most progressive nation of Asia.

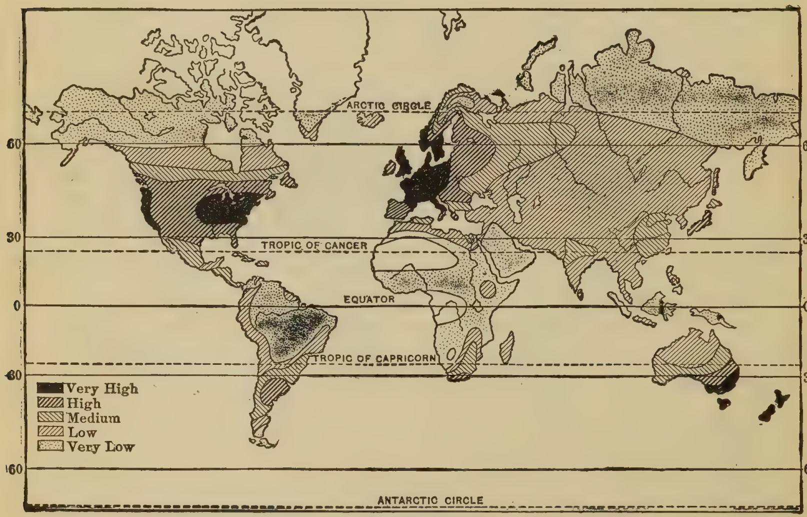


FIG. 25.—World Map of Civilization.

In the world as a whole, we seem to be led to the same conclusion as in America and Europe. Climatic energy, health and civilization go hand in hand, and with them goes business, as appears in Fig. 30. This map shows the per capita foreign commerce of the world distributed as nearly as may be to the place where it originates or where the goods are first sold. It represents with considerable accuracy the distribution of all kinds of business activity as well as of commerce. It likewise represents the degree of productivity of the various countries and the approximate strength of their demands for food, raw materials and manufactured goods. As it stands the map shows the same general features as the maps of climatic energy, health and civilization. If allowance were made for differences within each country the resemblance would be much more marked. Huge countries like India, China, Siberia, Canada, and the United States would show grades of activity much like those in Figs. 24 and 25. The resemblance between the maps of energy, civilization, and business suggests that health and energy are essential conditions of civilization, and are among the conditions needed for business activity. And the highest development of health seems to depend on a stimulating climate. Several other conditions, however, are at least, equally important.

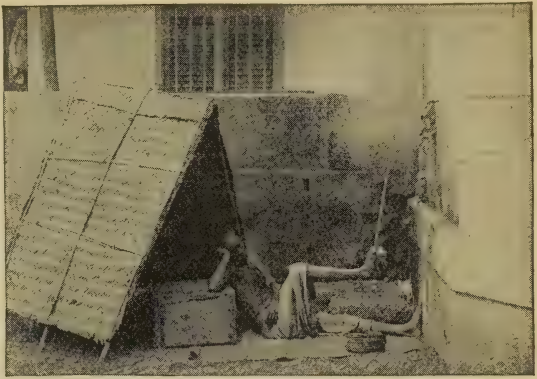
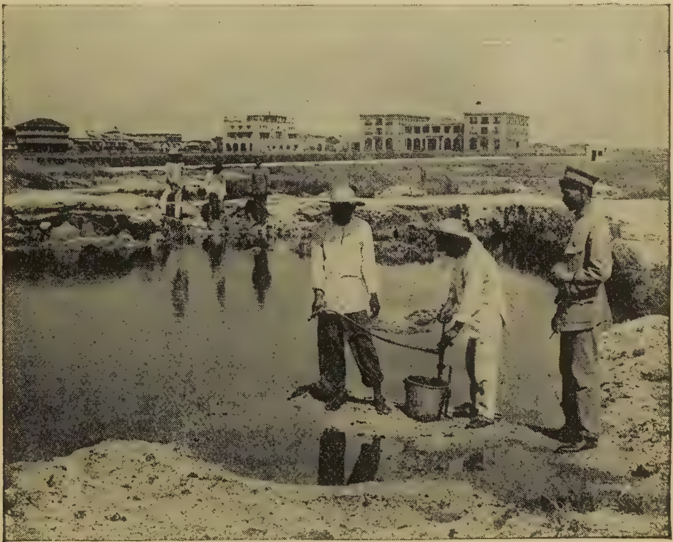


FIG. 26.—Indian Coolie Working a Punkah or Fan for Cooling a House.

A land where the combined ravages of climate and disease sap man's energy.



Courtesy of Asia Magazine and Philippine Bureau of Science.

FIG. 27.—Mosquito Fumigation in Manila.

Northern methods applied to the reduction of disease within the tropics.

Only a race of fine mental capacity can be expected to rise high. Only a race which develops a good government and good business methods and which has high standards of education, morals, and religion, can reach the highest levels. These conditions have long been recognized as essential to a high civilization. Our maps suggest that a stimulating climate should probably be added to their number.

In considering this conclusion the thoughtful student at once inquires about the past. Mesopotamia, Syria, Egypt, Carthage and other great civilizations grew up in regions where the climatic energy is now low. The wonderful Maya civilization of Central America made its growth in what is now one of the worst climatic regions on the globe. Many people have thought that these facts prove that a stimulating climate is by no means essential to civilization. A sound conclusion is possible only from a study of the climate of the past. During recent years there has been a hot debate over the question of climatic changes. Various hypotheses such as those of climate change due to deforestation, a steadily progressive change, and climatic uniformity have all been advocated, but have been rejected, as has the idea that climatic changes have been of the same kind in all parts of the world. The hypothesis which is now most widely accepted is that of pulsatory changes whose nature varies in different parts of the world. In other words, during some centuries and in some regions the climate has been appreciably more stormy than now; at other times and in other places less stormy. Although some people still question this, it seems to be supported by abundant evidence from widely separated parts of the world.

Thus a stimulating climate, good health, and abundant energy appear to be essential conditions of civilization, and of the activities that lead to important business relations. Climate and health join with race and training in determining the importance of a region in the world's work.

EXERCISES AND PROBLEMS

1. Make a statistical comparison of urban and rural health. Table 48, Col. A, gives the annual deathrate per thousand inhabitants in 1916 (an average year) in cities of 10,000 or more population; Col. B, the rural deathrate, that is, the rate for the rest of the state; and Col. C, the percentage by which the urban rate exceeds the rural. Virginia, Kentucky, and the Carolinas are omitted in Col. C, because the extreme differences which they appear to show between rural and urban rates probably mean that many deaths are not recorded in the rural districts. The absence of figures in large areas means that in 1916, many states had not advanced to the point where they kept careful vital statistics, as the records of marriages, births, and deaths are called.

Plot the figures of Col. C, on an outline map. In how many states is the urban deathrate higher than the rural? In which is the rural rate higher? A low urban rate may indicate efficiency in the city health departments, and it may indicate some natural advantage. The greatest natural advantages enjoyed by some of the cities and not by most of the rural districts of the states in Table 48, are:

(A) A location close to large bodies of water. A position close to the open ocean, as at Boston, is best, but New Haven on Long Island Sound, and Chicago on Lake Michigan are examples of places which enjoy the same advantage to a less degree. At such places as Philadelphia the advantage is practically lost because winds from the ocean must blow a long distance over the land before reaching the city. The advantage of a position close to the water is evident from the fact that people go to the seashore for health not only in summer, but in winter, as at Atlantic City.

(B) A location in the less extreme part of states like Washington and California where the interior is dry and hot in summer, or like New Hampshire or New York which have elevated or northern portions where the winters are very cold.

Divide the states of Table 48 into three groups according to whether the chief cities have (*a*) much, (*b*) some, or (*c*) no advantage over the rural parts of the state in these two respects. Find the average percentage by which the health of the cities is better or worse than that of the rural districts in each of the three groups. Explain your conclusions as to the healthfulness of cities compared with the country districts.

2. Fig. 21 shows the approximate distribution of health among people who are mostly of north European stock, who can afford life insurance and also care in time of sickness, and who are in general of about the same type in all parts of the country. The health of this homogeneous group of people varies from state to state for many reasons including (*A*) occupations, for farming is much more healthful than manufacturing, (*B*) degree of prosperity, for people who are in comfortable circumstances not only can afford medical care but are usually more intelligent than the very poor, (*C*) the extent to which people live in cities, (*D*) climate, and (*E*) the degree to which the population includes physicians and other professional men who tend to create high standards. Some of these factors are more important and some less, while very often one counteracts another. In order to see which factors are important compare Fig. 21 with the following maps and determine in which cases Fig. 21 distinctly shows the influence of any of the factors.

A. An isopleth map of the percentage of the gainfully employed population engaged in agriculture, Table 8, Col. C.
B. Isopleth map of percentage of persons who pay income tax, Table 46, Col. F.
C. Isopleth maps of percentage of population in cities, Table 2, Cols. E and F.
D. Fig. 23, map of climatic energy.
E. Isopleth map of percentage of gainfully employed population engaged in professions, Table 8, Col. I.

Which factor seems to you most important in determining the distribution of health among the more comfortable half of the white people of the United States? Why?

3. Col. A, Table 49, gives the average deathrate of the large cities of the United States from 1915 to 1919, including the period of the great influenza epidemic.

Figures for other years show similar differences, but a lower average. Note the marked contrasts between neighboring cities; for example, Boston and Cambridge, San Francisco and Oakland, Baltimore and Washington. Explain these differences.

4. The deathrate among the foreign-born inhabitants of the United States is greater than among the native-born. This is probably largely because of the way in which the foreign-born live. On the basis of an isopleth map drawn from Col. H, Table 2, in what states does the presence of foreign immigrants most lower the average conditions of health?

5. What does Col. E, Table 49, indicate as to the health of colored people compared with white? The statistics of some of the southern cities are probably incomplete and the rates in the table are lower than the reality, but the contrast between white and colored is not affected by this. In general, is the contrast between the races greater in the South or the North? How do you explain this?

6. From Table 48, Col. A, insert the urban deathrates on an outline map, and shade the areas having deathrates (*A*) over 18, (*B*) 14 to 18, and (*C*) under 14. Explain the distribution of these areas on the basis of (*a*) climate, (*b*) occupations, (*c*) percentage of population in cities (see Col. E and F, Table 2), (*d*) percentage of foreign born, (*e*) percentage of colored people.

CHAPTER VII

THE GEOGRAPHIC BASIS OF EXCHANGE

The Conditions Which Create a Surplus.—Good business, as we have seen, involves an exchange which is profitable to both parties. Such an exchange requires a surplus on one side and a demand on the other. That is, one person, company, or country must have more of something than is needed for immediate use, while someone else must need that particular thing. The thing for which there is a demand may be a concrete product like spices, lead, or adding machines, or services such as day labor, clerical work, or the skill of a great pianist. Let us see how variations in the surplus supply of goods and in the demand cause business transactions to vary in kind, number, and quality from one part of the world to another.

Everything which favors production also favors the creation of a surplus. A level plain, fine rich soil, easy access to navigable waters, and a climate with sufficient warmth, moisture, and sunshine, all stimulate the production of most of the vegetable and animal products which enter into the world's food supply and furnish raw materials for manufacturing and commerce. On the other hand, a rugged topography encourages the production of lumber and of crops like fruit and coffee. In conjunction with a dry climate a rugged topography generally favors the production of metals. These physical conditions, however, including also their effect on transportation, are not the chief factor in producing a surplus. Still more important is the quality of the people, their inherited mental ability, their energy, and their standard of living. New Guinea's physical advantages would allow it to raise enough rice for almost the whole world, together with great quantities of sugar, corn, sago, cocoa, tea, coffee, tobacco, and many other products, but it has no surplus. Its backward people produce almost nothing except what they immediately consume. In Java, however, where the climate is almost the same, the presence of nearly 150,000 Europeans, chiefly Dutch, causes an island smaller than New Guinea to export products worth half a billion dollars each year. Again, in China the supplies of coal are almost as good as in Britain, but until Europeans took the lead, the Chinese mined practically no coal even for local consumption. Vast quantities lay in the rocks, but there was no surplus for business.

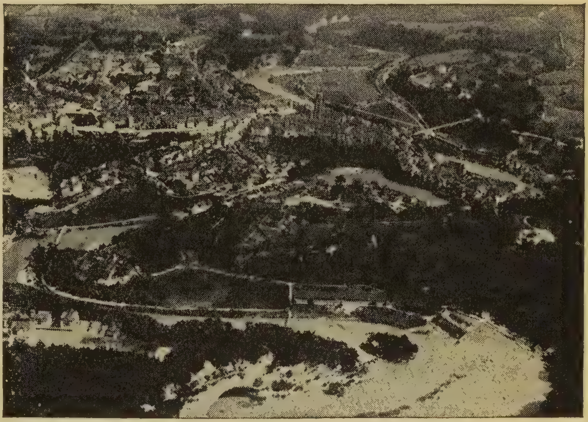
On the other hand, Norway has almost no mineral wealth; her cool climate greatly limits the crops; deep soil is found only in a few valleys and on a narrow coastal plain; and the rugged topography permits only one acre in thirty to be cultivated. Yet so energetic and capable are the Norwegians that their abundant surplus not only supports an active trade at home, but makes Norwegian exports fourteen times as valuable as those of Java in proportion to the inhabitants. Again, Alaska never yielded any surplus worth mentioning while it was in the hands of Eskimos, Indians, and even Russians; but from the time when it was bought by the United States until 1920 it yielded a salable surplus worth about a billion dollars. So, too, although New England has no coal, few raw materials, and not nearly enough water power, the capacity of its people causes it to produce an enormous surplus of manufactures.

Keystone View Company.

FIG. 28.—Along the River Front in Siam.

The Conditions Which Create a Demand.—The conditions which create a demand are in one sense the opposite of those which create a surplus. If a region lacks certain natural advantages, it often demands articles which can be produced only with the help of such advantages. The United States demands a vast quantity of bananas and gets them from Central America because the Central American climate favors banana growing and that of the United States does not. New England, being too rugged for extensive wheat cultivation, demands wheat from the Western plains, while Germany, having little copper, demands it from places like Arizona and Montana.

In a more important sense the conditions which create a demand are exactly the same as those which create a supply. For example, the fact that coal and iron are scarce in Ceylon does not cause the four million people of that island to demand a tenth or perhaps a hundredth as much of those two highly important products as is demanded by a similar number of people in the Netherlands. The thing that counts chiefly in creating a demand, just as in creating a supply, is the mental ability, physical energy, and stage of civilization of a country. So far as actual resources are concerned Siam with eight million people ought to supply more and demand more than Switzerland with four million. The area of Siam is 195,000 square miles, while that of Switzerland is only 16,000. Siam also has a far more productive climate than Switzerland, a vastly greater area of plains, and excellent deposits of tin as well as some other minerals, whereas Switzerland has practically no minerals. If the people of Siam and of Switzerland were of exactly equal ability, these conditions might cause the trade of Siam to be at least double that of Switzerland. But in the normal period before the Great War Siam did not import a single product to the value of one dollar per inhabitant each year, as appears below, and only four to the extent of fifteen cents or more per inhabitant. Switzerland, on the contrary, imported twenty products to the value of at



Courtesy of Ad Astra-Aero, Zurich.

FIG. 29.—Looking Down on Fribourg, Switzerland.

This city with its beautiful cathedral, highly developed water power, and convenient means of transportation vastly surpasses Siamese cities of similar size both in production and in demands.

least one dollar per person, and many others to the extent of at least fifteen cents.

CHIEF PRE-WAR IMPORTS AND EXPORTS PER PERSON PER YEAR

SIAM.	Imports.	Exports.	SWITZERLAND.	Imports.	Exports.
Cotton goods	$0.80	$	Cereals	$11.70	$ 0.33
Oils	0.16		Silk goods	9.70	13.70
Silk goods	0.15		Cotton goods	6.65	13.20
Sugar	0.15		Mineral substances	6.31	.76
Rice	.....	4.40	Iron work	5.20	1.66
			Colonial produce	5.20	3.95
			Animal foods	4.97	6.12
			Gold and silver	4.05	1.04
			Woolen goods	3.75	1.21
			Beverages	3.04	.15
			Live animals	3.04	.57
			Ready-made clothing	2.86	1.15
			Hides and skins	2.84	2.39
			Fruit and vegetables	2.50	.06
			Machinery	2.52	4.98
			Chemicals	2.41	1.03
			Timber	2.10	.42
			Copper work	1.69	.52
			Grease, oils, etc	1.49	.11
			Linen and hemp goods	1.18	.23
			Clocks	.36	9.25

The extraordinary difference between Siam and Switzerland is largely due to the character and civilization of the people. Distance has something to do with it, but not much, for in proportion to the population the list of imports into Australia, one of the most distant parts of the world, is as imposing as that into Switzerland, as may be seen below.

The Character of Foreign Business in Three Types of Countries.—These tables show marked contrasts not only in the amounts but in the kinds of goods imported into Switzerland, Australia, and Siam. The Swiss imports include food, raw materials amd manufactures; those of Australia include almost nothing except manufactured goods although these are very varied; the Siamese imports are likewise manufactured goods, but of simple nature and few kinds. These are the normal imports of three distinct types of countries: (1) a small, old, densely populated country lying near the center of civilization and having few mineral resources; (2) a large, new, energetic and sparsely

CHIEF PRE-WAR IMPORTS AND EXPORTS PER PERSON PER YEAR

Australia.	Imports.	Exports.	Australia.	Imports.	Exports.
Metal manufactures....	$11.80		Tobacco..............	$1.10	
Cotton and linen goods.	4.60		Wool...............	.....	$26.30
Other apparel.........	4.50		Wheat...............	.....	8.00
Machinery............	4.30		Skins and hides.......	.....	5.50
Timber...............	2.90		Butter...............	.....	3.60
Drugs, chemicals, fertilizers...............	2.50		Copper...............	.....	3.00
			Beef.................	.....	2.70
Woolens..............	2.10		Zinc.................	.....	2.20
Paper................	2.00		Tallow...............	.....	2.20
Silk goods............	1.90		Mutton...............	.....	2.00
Bags and sacks........	1.90		Lead.................	.....	1.80
Oils..................	1.80		Coal.................	.....	1.10
Spirits...............	1.40		Tinned meat..........	.....	1.10
Tea..................	1.30		Silver................	.....	1.10
Gold.................	1.20	$3.50			

populated country far from other civilized regions; and (3) an old fairly well populated but undeveloped country where people have little energy. The differences between these various countries, like many other facts, show that the activity of the people is the chief determinant of the *amount* of business, but the natural resources, the position, and the stage of development determine the *kind* of business. The distinction between the amount and the kind of business is very important.

In exports, as in imports, Siam, Australia, and Switzerland afford an important contrast. Siam, with its one export of a very simple kind, illustrates the lowest stage. In spite of great natural resources the Siamese do not work hard enough and use sufficient judgment and skill to produce a surplus of anything except rice, their main article of food. The small size of their surplus, quite as much as the moderate nature of their desires, limits the size of their trade. In Australia, as in Siam, the exports are almost entirely different from the imports. That is the natural condition in a new country which has abundant resources. The easiest and quickest source of wealth is found in raising sheep, cattle and wheat, and in mining the metals. Therefore there is relatively little manufacturing. But notice how much more varied are the exports of Australia than of Siam, as befits the greater physical and mental activity of the people and their higher standards of living. In Switzerland, on the other hand, the imports and the exports are largely the same in name but not in form. For instance, silk and cotton goods are imported as thread and exported as fine cloth. The Swiss cannot create a surplus by extracting the natural resources of their country; hence they take raw materials or partly manufactured materials from other countries and add to them their own skill so that the final products usually owe more of their value to manufacturing than to the original materials. Swiss exports, however, are in most cases less than the imports because the Swiss have large foreign investments on which interest is paid in the form of goods, and because large numbers of tourists must be taken care of.

Most parts of the world can be classified according to these three types: (1) Backward countries with poorly developed resources, few and simple products, almost no manufacturing and a small surplus used to satisfy a demand for a few simple manufactures. (2) Progressive new countries with well-developed resources, a variety of products, little manufacturing, and a large and varied but unmanufactured surplus which enables the people to satisfy their demand for a great variety of manufactured articles. (3) Progressive old countries with resources inadequate to the population, but with a great variety of manufactured products which form a surplus whereby the inhabitants satisfy their demand for raw materials, food, and luxuries. The United States perhaps belongs in still a fourth class, like No. 2 except that manufacturing is highly developed, or perhaps between No. 2 and No. 3.

The World's Foreign Commerce.—The effect of civilization on commerce is illustrated in the following table which shows the total foreign commerce per inhabitant in two groups of countries which stood particularly high or particularly low in this respect in the period immediately before the Great War when conditions were more nearly normal than at any time since.

Country.	Annual Foreign Commerce per Inhabitant.	Country.	Annual Foreign Commerce per Inhabitant.
Netherlands	$449.70	French Indo-China	$4.02
Belgium	220.60	Chosen	3.17
Switzerland	167.30	China	1.81
Denmark	151.90	Liberia	1.58
Canada	141.30	Belgian Congo	1.08

A more impressive illustration of the same fact is seen in Fig. 30, which shows the total commerce per inhabitant of each country. Foreign commerce and domestic commerce, as well as other kinds of business, generally reach their greatest activity in the places where people have much energy.

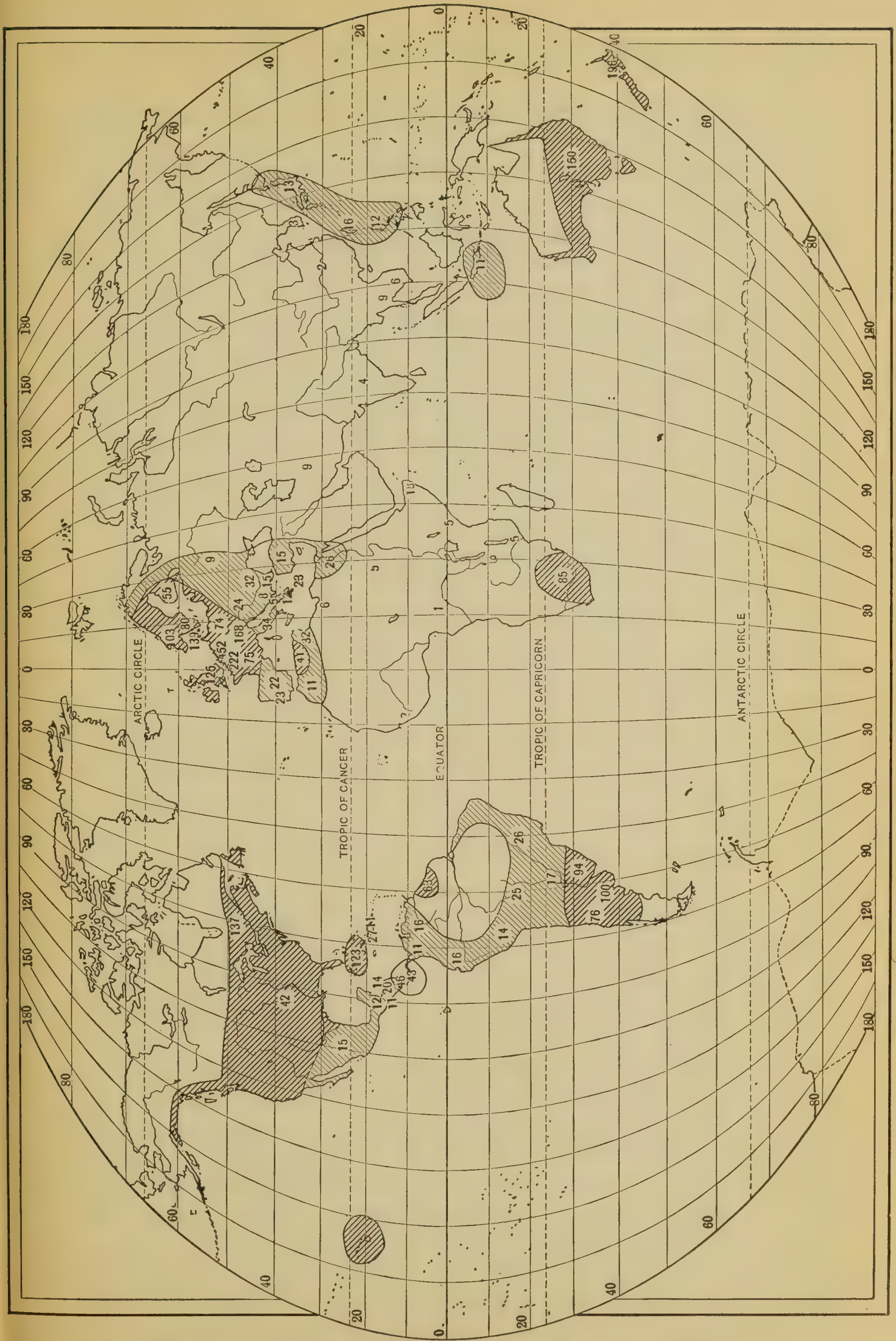


FIG. 30.—The World's Foreign Commerce per Capita in 1913.

The Effect of Size on Foreign Commerce.—The amount of foreign commerce depends on other factors beside the general activity of domestic commerce and industry. This is evident from the fact that the United States, which is one of the most progressive of all countries, is not included in the five having the greatest foreign commerce per capita. In fact, its pre-war figure was only $43.15, which places it nineteenth. This, of course, is far below its rank in civilization. Cuba, Costa Rica, Argentina, Uruguay, Chile, and even Dutch and British Guiana all stand ahead of it. China, like the United States, stands low in foreign commerce per capita, being third from the bottom. Such places are Paraguay, Haiti, Formosa, and Portuguese-Africa stand well above it, although certainly their civilization cannot rival that of China. Again Russia, with an annual foreign trade of $8.56 per capita stands lower than Serbia, $9.69, Paraguay, $11.16, Bulgaria, $15.37, and Roumania, $33.63.

Thus the per capita foreign trade of a small or sparsely populated country, or of one with no great variety of occupations, is almost certain to be larger than that of an equally progressive, large or populous country with a great variety of products. For example, the United States, China, and Russia being large, populous countries, with varied resources, stand relatively low compared with such small countries as Cuba, the Guianas, Paraguay, and Roumania. Again, in Europe the little countries of the Netherlands, Belgium and Switzerland all have more foreign commerce per capita than the larger countries of Great Britain, France, and Germany. Yet in the large countries business is quite as active as in the small countries.

The reason for this seeming contradiction between the foreign trade of large and small countries can easily be understood from two examples. Suppose that the Netherlands and Belgium should unite. The domestic trade within their area would probably increase, but their combined foreign trade would be less than their trade when separate, because all the goods which now pass across the border between Belgium and the Netherlands, and which are reckoned as part of the foreign trade of each country, would be classed as domestic commerce. In the same way because Cuba devotes itself largely to sugar and tobacco, it relies on the United States not only for manufactured goods but for food for its sugar raisers. Hence it has more foreign trade per capita than the United States. Now suppose the United States were divided into several countries so that the manufactures of the northeast were exported to the prairie states in exchange for food, to the South in exchange for cotton, and to California in exchange for fruit and winter vegetables. The per capita foreign commerce of these new countries would rise far above that of the present United States. Hence, we conclude that while the foreign trade of a country is an index of its progressiveness, careful allowance must be made for the fact that a large country, especially if its products are varied, does not have so great a trade per capita as an equally progressive small country, especially if the small country produces only one or two main products.

Conditions Which Promote an Active Exchange of Products.—Let us now sum up all the main conditions which lead to an active exchange of products, no matter whether the exchange be between foreign countries or different parts of the same country. The chief of these are as follows: (1) *Racial Character.*—This depends on inheritance, health, and energy, and is one of the chief causes of the supremacy of northwestern Europe, the United States, Canada, New Zealand, and Australia in commerce and other kinds of business.

(2) *Diversity of Products.*—This is determined largely by climate and mineral resources, but also by relief and soil. The accidental introduction of an industry may also be important, as when Flemish weavers introduced their art into England, and Greek miners moved into Turkey. Tropical countries owe most of their trade to the fact that their products differ from those of temperate regions. Venezuela and India, for example, would have little foreign trade if people from other climates in the United States and Europe did not come to them for products that are found only within the tropics. Nevertheless, the fact that the two tropical countries have products different from those of the northern regions may in the future stimulate trade far more than at present.

(3) *Government.*—The *form* of government makes little difference: a republic is good in Switzerland, bad in Ecuador; a constitutional monarchy is good in Britain, bad in Turkey. The *character* of a government is what counts, and that depends largely on the character of the people. A wise government can greatly increase trade by making proper laws as to taxes, shipping, and commercial intercourse. Many people think that Great Britain owes much of her foreign commerce to her policy of free trade, while others think that a protective tariff has stimulated domestic trade in the United States. Both points are disputed, but almost everyone agrees that when backward people are governed and directed by those who are more progressive, trade is usually much stimulated. If India, the Philippines, and especially the Guianas had never been under foreign governments, their positions in the table of foreign trade per capita would be much lower than at present. In fact, they would almost disappear.

(4) *Distance* is also highly important in determining the amount of trade between two regions. We might get from the East Indies all the products that we get from the West Indies, but we actually get relatively little. It would scarcely pay to carry products five to seven thousand miles when we need to carry them only one to three thousand. It should be noted, however, that distance is a purely relative matter. It is easier to carry goods 7000 miles by sea where lines of communication are already established than 100 miles across mountains with no roads.

(5) *Language and Customs* likewise play a great part in foreign trade. Customs, or habits, are like government in being largely the product of racial character. An astonishingly small matter will prevent trade even among highly civilized people. For example, the British buy a good deal of American salt pork. But the pork must be salted with British salt. American salt leaves an insoluble white residue on the meat. This does no harm and Americans rather like it; but the British object. Hence, in order to maintain a profitable British trade, the packer must import British salt which is absorbed completely by the pork. As for language, everyone prefers to do business with someone whom he can understand. Hence, while Portugal does only a negligible business with the rest of South America, a fifth of all her exports go to the Portuguese-speaking country of Brazil.

The Ideal Conditions for Active Exchange of Products.—Ideally the conditions most favorable to active business between two regions are as follows: (*A*) Both should be inhabited by people of high mental capacity and of as great energy as is consistent with the climate. (*B*) The two regions should be quite different in climate so that one, for example, produces cereals, beef, mutton, hides, wool, soft wood, and other products of the temperate zone, while the other produces sugar, coffee, rubber, tropical fruits, spices, hard wood, fibers like Manila hemp, and other tropical products. (*C*) At the same time, the cooler country should have plenty of coal, petroleum, and water power so that manufacturing is stimulated; while the other should produce all sorts of metallic ores, especially iron, which can readily be taken by sea to the coal of the other country. The coal country should also produce mineral fertilizers which are chiefly needed in the warmer country. (*D*) The countries should lie as close together as is consistent with a pronounced climatic difference, and should be connected by a sea, both coasts of which have been submerged so as to provide many deep indentations and good harbors. Thus transportation will be as easy as possible. (*F*) Both countries should be under the same government, and the government should be wise, honest, and progressive. (*G*) The people in both regions should speak the same language and should be as similar as possible in ideals and habits so that they will understand one another's preferences and peculiarities.

The eastern United States and Cuba; England and Ceylon; the Netherlands and Java; and Belgium and Belgian Congo are pairs of countries which approach the conditions most favorable for trade. All fall far short of the ideal here described, but the United States and Cuba approach it most closely. In spite of their differences in racial character, government, language, and customs, their nearness and the fact that they have almost the right degree of difference of climate, plus the activity of the United States, causes the per capita trade of the Cubans with the United States to be exceeded only by that which the Dutch are able to carry on with the Germans because they hold the mouth of Germany's main river. Everywhere the activity with which any two regions carry on the exchange of products and services can be largely explained by the five factors here considered, namely, racial character, diversity of products, government, transportation, and language and customs.

EXERCISES AND PROBLEMS

1. Divide the class into groups to investigate the demands of your state and others in comparison with their production and surplus. Base your estimate of the demands on the following lines of investigation. (*A*) In the state assigned to you compare the percentages of the gainfully occupied population engaged in agriculture, mining, and manufacturing with the similar data for the whole U. S. (Table 8). Assume that the percentages in Table 8 for the whole country represent about the necessary proportions of the three occupational classes which actually produce goods. In what respects is your state weak?

(*B*) In the U. S. as a whole about 60 farms and 5000 acres of improved land supply the needs of 1000 people. From the Abstract of the Census ascertain how these figures compare with those of the state you are working on. Table 24 D shows how the average total yield of all crops per acre varies from state to state. What difference does this make in your estimate of the amount of improved land needed to supply the needs of your state?

(*C*) Table 42 shows average consumption per capita in the U. S. in 1920; similar approximate data for other products are as follows:

I. APPROXIMATE ANNUAL CONSUMPTION PER CAPITA IN THE UNITED STATES, 1919 OR 1920.

Oats	10 bu.	Petroleum	200 gal.
Potatoes (all kinds)	4 bu.	Lead	10 lb.
Orchard fruits	2 bu.	Copper	8 lb.
Vegetables—Product of	0.014 acre	Zinc	7 lb.
Grapes	25 lb.	Rubber	5 lb.
Tobacco	13 lb.	Silk	0.3 lb.
Peanuts	¼ bu.	Lumber	300 board feet
		Manufactures valued at	$590 (Perhaps $400 in 1922)

II. NUMBER OF ANIMALS AND AMOUNT OF HAY AND FORAGE NEEDED TO SUPPLY THE AVERAGE PERSON IN THE U. S. WITH ANIMAL PRODUCTS IN 1919

Horses or mules	0.25	Swine	0.56
Beef cattle	0.34	Chickens	3.5
Dairy cattle	0.30	Hay and forage	1.4 tons
Sheep	0.33		

Calculate the needs of your state for each of the products named in Table 42 and in this exercise, assuming that the requirements are like the average for the U. S. Compare the state's needs with its production as given in Tables 16, 20, 26 (count 2 tons of iron ore as roughly equal to one ton of pig iron), and 28; in the Abstract of the Census; and in Table 31 (use column K and base your conclusions on an average value of $237 per capita added by manufacturing instead of on $590, the total value of manufactures per capita). Your own general knowledge will give the necessary facts for certain other articles such as rubber.

Complete the work by preparing a table showing (*A*) your state's deficit in the articles which are not produced in sufficient quantities, (*B*) a region of surplus production where your state can easily supply its needs of each article; (*C*) your state's surplus in various articles; and (*D*) an easily accessible region where a demand for each of these articles exists because of a deficit. Explain the geographical causes of the main features of the deficit and surplus in your chosen state.

2. Examine the conditions which determine the variation of prices from place to place. In Table 19, 23, or 43*a* choose some product and make a shaded isopleth map of its variations in price from state to state. Make other maps of the same article from Tables 17 and 18, 21 and 22, or 28 *C* and 43*a*. Compare the three maps of each product. Try to determine how far prices are influenced by (*A*) abundance of production per capita, (*B*) proximity to great cities and industrial areas, (*C*) transportation and its relation to (*a*) the bulk or weight of the article, (*b*) its fragility, or tendency to spoil rapidly, (*c*) the degree of accessibility of the region of production and its relation to seaports and trunk railways.

3. Prepare an isopleth map from one of the columns of Table 44, putting the prices at the positions of the cities. What special differences do you note between the general character of this map and of the maps of prices of agricultural products and lumber constructed in Exercise 2? Explain. Sum up your conclusions as to the cuases that influence variations in price from place to place.

4. Contrast the foreign commerce of two distinctly different countries in the same continent, for example Chile and Ecuador. From the Statesman's Yearbook list the exports and state the dominant conditions in each country which allow a surplus to be produced for export. Make a similar study of the imports and state the reasons why they are of a given type. What indications does the foreign trade supply as to which country is more advanced?

5. In Table 39, select the five leading countries in the column "Number of times by which the imports exceed the exports" and analyze the conditions to which this is due. In the cities listed in Table 40, how commonly do either exports or imports exceed each other by a large ratio? In the case of Rostov, Russia; Iquique, Chile; and Bilbao, Spain, what explanation can you find?

6. Among the United States Customs Districts in Table 41, Galveston shows a wide divergence between imports and exports. Analyze the city from the standpoint of what is said in the text as to "Conditions which promote an active exchange of products" and "Ideal conditions for active exchange of products."

CHAPTER VIII

TRANSPORTATION: THE EQUALIZER OF SUPPLY AND DEMAND

How Transportation Equalizes Supply and Demand.—We saw in the last chapter that all business is an attempt to satisfy the needs of one set of people with the surplus produced by others. In order thus to equalize supply and demand transportation is essential, for only in the regions of very low civilization are the demands of a people satisfied by local products. In 1921 there was a tremendous demand for food in famine-stricken Russia and a fair supply in the United States, Argentina and Australia. But the demand could not be met, even if the Russians had had a surplus of other kinds wherewith to pay for food, for their transportation system was not working effectively.

Transportation systems are often thought of as mainly a means of carrying *people*, and as designed to carry people for pleasure or for purely personal reasons quite as much as for business. But the greatest of all transportation systems are designed for freight even more than for passengers. They could scarcely be made to pay if passengers were their sole reliance. Roads like the New York, New Haven, and Hartford, or the Long Island Railway which derive half or more of their revenue from passengers have had unusual financial difficulties. In the United States as a whole, three-fourths of the railway receipts are from freight. The net revenue from passenger service including fares, mails, and express, is from one to three dollars per mile of train service, while for freight trains the revenue is $1.50 to $4.00 per freight train mile. The Pennsylvania Railroad derives 70 per cent of its profits from freight, owns 166,883 freight cars against 4921 passenger cars; and its freight traffic in 1920 amounted to 1,373,000,000 car miles against 259,494,000 car miles for its passenger traffic. Over each mile of track on an average it carried 544,000 passengers and 5,512,000 tons of freight. Again, of the ocean steamers owned in the United States, the large majority are primarily freight ships. Even when a great ship like the *Aquitania* is primarily a passenger vessel, its load of freight furnishes a large share of the net profits. Moreover, if the commuters are included, probably 95 per cent of all the passenger traffic on railways, trolley cars and boats is for the purposes of business. All this is an attempt to make the supply equal the demand, for the passengers are going to the places where their services are needed, or away from places where they are no longer needed. Only a few railways like the Pikes Peak road, were built largely for passenger traffic and belong to the types of business dealing with recreation. A still smaller number, such as the French railways in Indo-China and especially the railways parallel to the frontier in Germany, were planned primarily for political and military purposes. Thus the main purpose of the world's transportation systems is to equalize supply and demand, by carrying freight and passengers.

How a Failure of Transportation Hits Business.—Transportation facilities are so much a matter of course that few people realize their full importance. Suppose all transportation should cease, and people did not even carry things by hand. Every kind of business would stop at once; city dwellers would starve, for practically all their food is transported from field, farm, forest, and factory. The tying up of transportation for even a single day creates almost inestimable loss. For example, a great blizzard in Chicago in 1918 practically put an end to all business for two days. Even in that short time people became greatly worried because there was so little milk for the babies, and other supplies began to run short. The hindrance to transportation for a few days in that one city and the consequent interruption of business cost millions of dollars.

How Human Activity Determines the Main Routes of Transportation.—The location of every line of transportation, whether it be a mere trail or a great steamship route,—depends primarily upon one geographical condition,—centers of human activity. Secondarily it depends on five other conditions: (1) distance, (2) relief, (3) cost of construction, equipment, and maintenance, (4) necessity of transshipment, and (5) natural resources. Sometimes one condition is more important and sometimes another, but none can be neglected.

The general location and importance of a transportation route depend first of all upon the activity and number of the people along its course, especially at the two ends. If the people are active they produce a relatively large surplus, and demand many goods which they do not themselves produce. Since they have to ship out their own surplus and bring in that of other regions to satisfy their demands, there must be much transportation of freight. Many passengers must also be moving back and forth to care for the equalization of surplus and demand which is thus going on. Hence the most important land route in the United States and perhaps in the world connects New York and

Philadelphia. These great cities not only exchange the products of their own hinterlands, but gather the surplus of vast areas both in the United States and abroad. Of the same nature although not quite so important are the routes (*A*) from Boston to New York, (*B*) Philadelphia to Baltimore and Washington, (*C*) New York via Buffalo and Cleveland or Detroit to Chicago, and (*D*) Philadelphia via Pittsburgh to Chicago or St. Louis. Other main routes run from Chicago and St. Louis westward to Seattle, San Francisco, and Los Angeles. In Europe one of the greatest routes is from London to Liverpool, while other great routes run from London to Paris, Paris to Berlin, to Vienna, and to Rome; from London to Berlin via Holland, and from London to Liverpool and Glasgow. Greater than any of these land routes, and greatest of all routes is the waterway that draws its traffic from Baltimore, Philadelphia, New York, Boston, and smaller cities, crosses the North Atlantic, and divides again to Liverpool, Southampton, London, Cherbourg, Antwerp, Hamburg and other cities.

All these routes are alike in one great respect; the details of their location are determined by plains, valleys, mountains, lakes, rivers, ocean currents, harbors, winds, ice, or fog, but their general position depends on the fact that they connect centers of human activity. For example, the exact position of New York is determined by a fine harbor to which the Mohawk–Hudson Valley gives easy access from the interior. But suppose there were no such harbor and valley, the great Atlantic trade route would still terminate somewhere in that vicinity. It might enter America at Boston, New London, New Haven, or Philadelphia, but it would have to exist because the numerous demands of the active population of the northeastern United States would still continue even if there were no New York. Thus we conclude that great routes of transportation grow up because active regions need to be connected. When once the routes are established they are powerful factors in causing the cities which they connect to become larger.

In the world as a whole, the greatest routes connecting active centers generally run east and west. The transcontinental railways of the United States and Canada are of this kind; so too are the trans-Andes railway from Argentina to Chili, the great railway east and west along the southern side of Australia, and the trans-Siberian road which connects the active Baltic portion of Russia with the active eastern Asiatic region which centers in Japan. The greatest railways that have been planned to run north and south must traverse warm, inactive regions, but their aim is to connect active centers in the northern and southern hemispheres. The greatest of all such projects is the line that will presumably some day connect the northern United States with Chili and Argentina. Another of the same sort is the proposed Cape to Cairo Railway in Africa. On the sea likewise, the great routes generally run east and west to connect the great centers of trade, as appears from a comparison of ocean routes, Fig. 31, with foreign commerce, Fig. 30, and civilization, Fig. 25.

How Physical Conditions Determine the Detailed Location of Trade Routes. (1) *Distance.*—After the general location of a transportation route has been determined by the centers of human activity, the details are determined by physical conditions. Other things being equal, the shortest route is chosen. Hence on the ocean, in the air, and on plains, the routes of transportation run almost straight except for the curve of the earth. Many railroads boast that they are "air-lines," and on their time tables they often distort the maps in order that their lines may appear to be straight and short.

(2) *Relief.*—Levelness is even more important than shortness. On the ocean or on lakes every route is level, while in the air no route can possibly be level. In this fact lies one of the greatest advantages of water communication over other forms, especially over communication in the air. In transportation by water nothing is lifted against the force of gravity; in transportation in the air everything must be lifted at least a few thousand feet and kept up. How much energy it takes to lift a body against gravity can be judged by trying to move a heavy automobile. On a perfectly smooth floor one man can start a vehicle weighing a ton or two, but he and several others cannot lift that same vehicle even an inch without a jack. So important is levelness that many long but level roads can compete with those that are much shorter but less level. For example, the "airline" between Boston and New York is shorter than any other but is little used because the hills not only cause it to go up and down but necessitate curves which limit speed and increase the cost of upkeep; the Delaware, Lackawanna, and Western route from New York to Buffalo (396 miles) is shorter than the New York Central (439), but its hilliness much diminishes its business. So too, the Southern Pacific or "Sunset Route" from New York by sea to Galveston and then across the Rockies to Los Angeles and San Francisco, is much longer than the direct routes from New York via Colorado, but because it is perfectly level on the ocean and relatively level on the land it easily competes with the far shorter and more direct but highly mountainous routes farther north. Among these mountainous routes the Denver and Salt Lake Railroad follows the Old Mormon Trail, and is relatively direct, but the fact that it climbs to 13,000 feet had much to do with its going into the hands of a receiver in 1915. Hilliness has an indirect as well as a direct

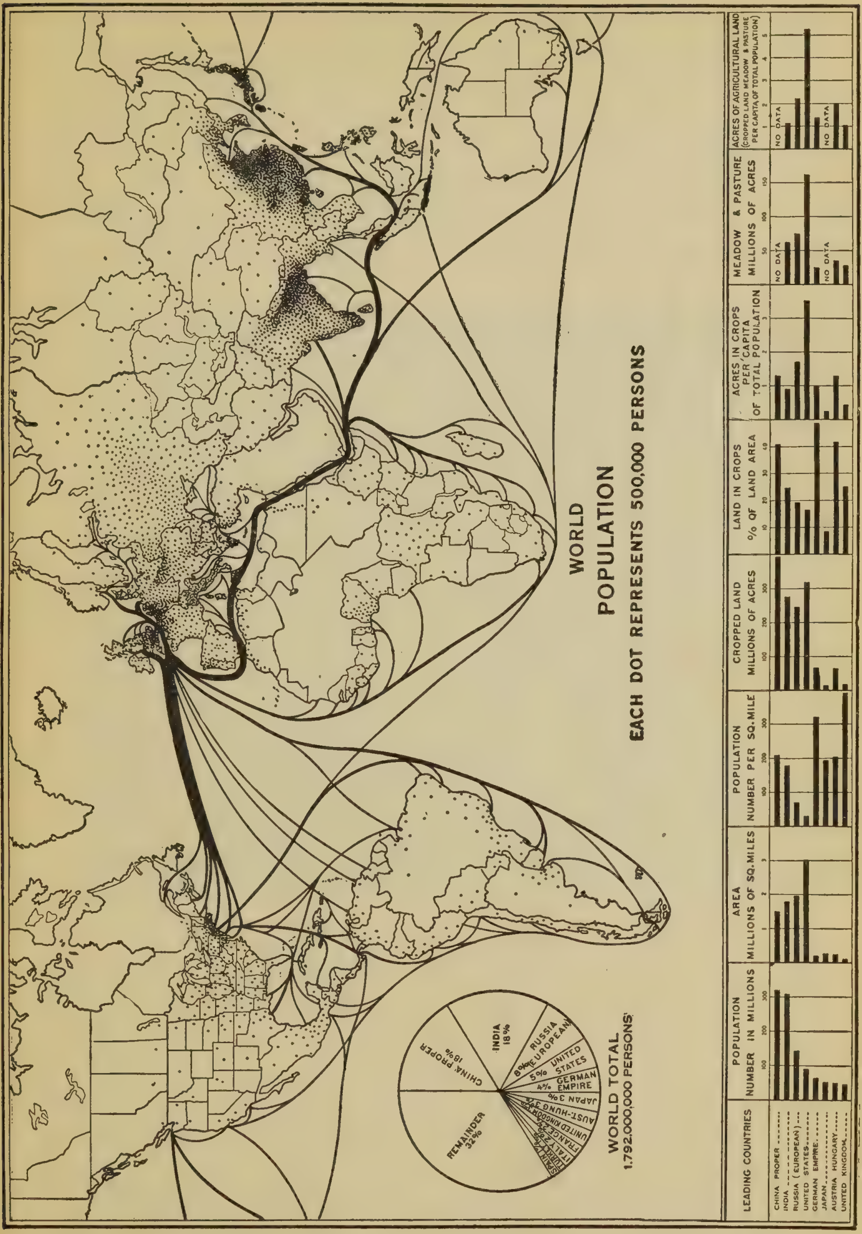


FIG. 31.—World Distribution of Population and Steamship Routes.

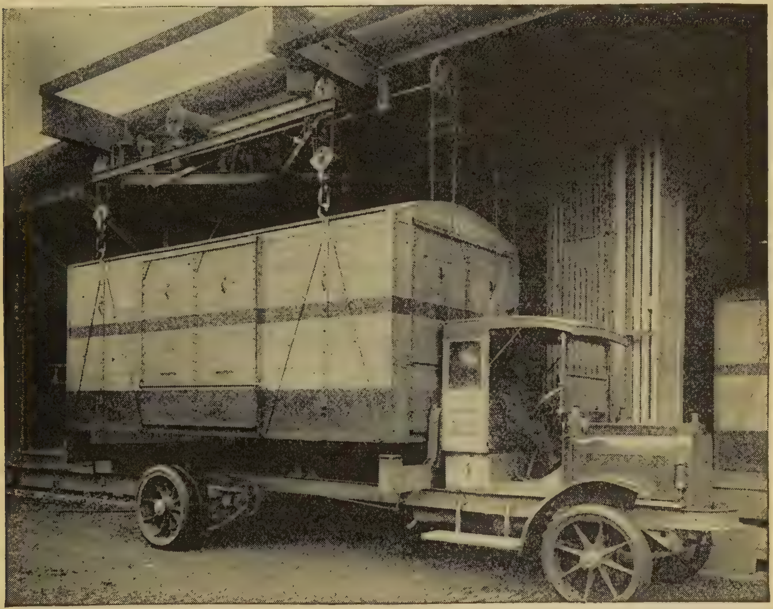
effect, for it causes the population to be sparse. Between New Haven and Boston the "air line" passes through no city larger than Willimantic, while the "shore line" passes through New London, Providence, and Pawtucket, and the Connecticut Valley line through Meriden, Hartford, Springfield, and Worcester. The largest cities on the short Delaware, Lackawanna, and Western Railroad are Scranton and Binghamton as contrasted with Albany, Utica, Syracuse, and Rochester on the New York Central.

(3) *Cost.*—Quite as important as levelness and shortness is the cost of construction, equipment, maintenance and operation. This depends partly on the expense of tracks, terminals and so on, partly on the cost of the actual means of conveyance, and partly on the size of the units that can be handled by a single crew. In all these respects water has a great advantage. No tracks are needed, and channels must be dug only for short distances at the entrance to harbors; there are no taxes and no upkeep to pay on the right of way; the terminals cost no more relatively than do those of a railway; the cost of a ship of a given capacity is scarcely more than half that of cars and locomotives of corresponding capacity; and a given number of men can handle a far larger load on a ship than on a train. This is illustrated in the following table:

	Average No. of Pounds of Fuel per Ton-mile.	Average No. of Days' Labor per 100,000 Ton-miles.
Railroads	0.066	2.5
Great Lakes carriers	0.029	0.9
Ohio River tow boats	0.021	1.3

Just as the water has an advantage over the land, so plains have an advantage over mountains. The first cost of building tracks on the plain is only one-half, one-tenth, or even one-hundredth as much as among the mountains; upkeep is correspondingly expensive in mountains and more trains and more men are needed for a given amount of work. As for airplanes, they are like steamers in having no expense for their right of way, but so long as the helicopter is not in practical use their terminals are so large in proportion to the traffic that they are extremely expensive. Moreover, the units are thus far of insignificant size compared with trains and steamships. The largest airplanes yet built carry only about 20 passengers where a single railway coach carries 60, and only about a ton of mail or baggage against 40 for a single freight car.

(4) *Trans-shipment.*—An important but often neglected reason for the location of trade routes is the amount of trans-shipment. To trans-ship an average carload of miscellaneous freight, for example, from one line of transportation to another costs anywhere from one to six dollars. If breakage and delay are added, the loss probably averages four or five dollars, or as much as to transport that same freight hundreds of miles. To transfer the same freight to a truck, drive to a wharf, transfer to a lighter, take the lighter out to an anchored steamship, and load the boxes into the steamer's hold may cost as much as to carry the boxes two thousand miles after they are once safely on the steamship. Hence, there is a strong tendency not only to avoid lighterage even at the expense of traveling several hundred miles to a deep harbor, but also to use a kind of land transportation that will pick up the goods as close as possible to their point of origin and carry them as close as possible to their destination without change of conveyance. So strong is this tendency that before the Panama Canal was built many ships, especially sailing vessels, found it cheaper to go around Cape Horn



Courtesy of Scientific American.

FIG. 32.—Demountable Auto Bodies in Process of Loading.

Such bodies can be shipped to distant points and be loaded and unloaded at leisure while the auto chassis and its driver are doing other work.

than to transfer their freight to the Panama Railway and then to other ships for Hawaii, Japan, and China. In ability to carry goods with little trans-shipment the automobile has an enormous advantage over the railway, and the railway over water transportation. Since the cost of transportation alone *without trans-shipment* is about ten times as much by rail as by water, and perhaps ten times as much by truck as by rail, in spite of the claims of the automobile makers to the contrary, and several times as much by horse as by truck, the problem of the business man is to find how much each trans-shipment costs including breakage and delay, how many trans-shipments are necessary by each mode of conveyance, and how their cost plus the cost of carriage and of delay compares on the various possible routes.

For example, many people have wondered why the Mississippi River is so little used in spite of the fact that from 1896 to 1920 nearly 600 million dollars were spent in trying to make it navigable. The answer lies partly in the fact that it flows in the wrong direction, for it does not go from the active Middle West toward the active manufacturing states of the northeast, and in that respect has none of the advantages which made the Great Lakes so wonderful a waterway. The answer also lies partly in the fact that the railroads have done their best to prevent the river from being used. In addition to this, however, and perhaps even more important, is the fact that the use of the Mississippi involves much trans-shipment. Suppose a farmer lives anywhere in the Mississippi Basin and is shipping wheat to the East by rail. He hauls it to the railroad by truck or wagon. There it is transferred to a grain elevator and then shot into a freight car. The car can go straight to some inland New England city where the wheat is made into flour or breakfast food and sold locally. The freight charges are high, but there are only two trans-shipments between the farmer and the local dealer. Wheat shipped by the Mississippi River is not only much longer on the way and hence more likely to be spoiled than if sent by rail, but it requires three extra trans-shipments and perhaps six. First, after a journey by rail it must be transferred to the Mississippi boat, but if no boat is on hand when the car arrives, the wheat goes to a grain elevator for later trans-shipment to the boat. At New Orleans it is again trans-shipped from the river boat to the ocean steamship either directly or by way of an elevator. Arriving at New York or Boston it must be transferred from the ship to an elevator and then to a freight car to be carried to its inland destination. In shipping grain directly to Europe the use of the great river would undoubtedly save expense. But so much of the food from the West is consumed in the eastern United States that the shippers plan mainly for that. The frequent trans-shipments, the length of the water journey and the relatively poor and infrequent service of the river boats prevent people from acquiring the habit of using the great Mississippi water route.

In Europe the necessity for trans-shipment is one reason why Britain surpasses most of continental Europe in transoceanic commerce. Since all foreign imports must be loaded upon ships, even if only to cross the English Channel, the extra cost of bringing goods across the ocean often adds relatively little to their cost. On the continent the use of different railroad gauges causes a vexatious trans-shipment problem at some international boundaries. Russia has a gauge of 5 feet and Spain and Portugal of 5 feet 5¾ inches. The other European countries generally use the standard gauge of 4 feet 8½ inches, although some French and other lines have a 4 foot 9 inch gauge. Originally many European countries deliberately adopted unusual gauges in order to make invasion difficult in time of war.

In the United States one of the greatest trans-shipment problems arises from the fact that the heart of New York City is located on the island of Manhattan. This has much to do with the fact that over 10,000 harbor-craft, lighters, and ferry boats are employed in New York harbor. A projected tunnel under the Hudson River for motor traffic will help the present railroad tunnels, but New York will still have serious trans-shipment difficulties.

(5) *Resources and Railroads.*—In the newer parts of the world, especially in the western United States, many railroads were built through regions with almost no population. Their purpose was to connect centers of population with regions where agricultural possibilities or mineral ores promised wealth provided there were transportation. Such railroads usually penetrate territory where an active population can live permanently, as in Kansas and along the Canadian Pacific, and hence are a permanent success. Other examples are many little lines built to open up coffee or fruit regions in Central America. Occasionally such railroads penetrate territory where the resources are soon exhausted. In Maine some logging railroads have been abandoned, as have several little mining lines in the Rocky Mountain States. Such railroads become of lasting importance only where the new region can support a permanently active and numerous population.

The Evolution of Transportation.—(1) *How Transportation Systems Have Become Adapted to Special Uses.*—The invention of new methods of transportation tends toward four results, (1) greater specialization and limitation, (2) greater power, speed, endurance, and load-carrying capacity, (3) greater danger, and (4) a greater demand for high mental ability. The invention of special modes of transportation to meet special needs has led not only to railways, steamships, automobiles, trolley cars, and airplanes, but to cash carriers, elevators, dredges, and pneumatic chutes for mail. It has produced traveling cranes for huge pieces of machinery, special tank cars for oil, steamships designed solely for ore or coal, trucks for furniture. Man has also devised ways of traveling not only on the land and on the water, but under the ground in tunnels, under the water in submarines, and in the air in airplanes. Indeed, whatever one may want to carry, or wherever one may want to go, there is usually some special method. Specialization, however, means also limitation. No one of the modern means of transportation is so able to go everywhere and carry every kind of article as the horse. When a great city in the climate of Philadelphia is blanketed with heavy snow almost everyone would be glad if the city's specialized truck transportation were replaced temporarily by horses. In fact, one of the greatest problems of modern transportation is that our best modern means of conveyance are almost useless except when their roads or tracks are very carefully made and tended.

(2) *Greater Speed, Endurance and Load Capacity.*—The most notable combination of speed, endurance and carrying capacity is the great ocean liner which can carry 30,000 tons of cargo beside 3000 passengers at the rate of 25 miles an hour for 10,000 miles without stopping. Suppose the same load were carried an equal distance by land on men's backs, each man carrying 100 pounds and walking 20 miles a day. The 3000 passengers on the steamship could do the work in 270 years without interruption for Sundays and holidays. Yet 500 men could handle such a ship if she carried only freight. The work of each man in the crew results in as much transportation as would the work of 21,600 men carrying loads on their backs.

(3) *Greater Danger.*—Each new type of transportation and each improvement in speed brings new dangers to life and limb. During recent years in the United States the number of accidents due to transportation has increased ominously. For example, for every hundred thousand people in the United States the following numbers were injured on railroads in each of several years:

1895	41	1910	129
1900	65	1915	162
1905	102	1920	159

Automobile accidents have increased so fast that the total number of deaths due to them in the registration area of the United States has risen as follows:

1911	1291	1916	5193	1920	9103

In 1921 the number for the whole United States rose to about 15,000, or about one death every half hour; and perhaps twenty times as many people were injured. In 1920 the number of fatal accidents due to all forms of transportation in the registration area of the United States was as follows:

Automobiles	9103
Railroads	8491
Street cars	2326
Other vehicles (chiefly horse-drawn)	2198

In proportion to the number of people who use airplanes, that mode of transportation probably causes far more deaths than any other. If the number of injuries in other kinds of accidents bears the same relation to deaths as in railroad accidents, the use of modern transportation facilities in the United States now causes an injury of some sort to one person in every 200 each year. Since the average lifetime is now about 36 years, and the number of accidents is increasing the chances are that at least one person in every 5 of those now living will at some time be injured in a transportation accident. Such injuries have a great effect on business because nothing makes more trouble than the sudden inability or death of trusted workers. In automobile and airplane accidents the conditions are particularly bad because a large share of those who are killed are children and young people, often with more than the average boldness, initiative and vigor. A recent investigation shows that 54 per cent of the deaths from automobile accidents occurred among children under 15 years of age.

(4) *The Demand of Transportation for High Mentality.*—Another noteworthy feature of transportation is that each step of progress demands higher mentality. The most stupid man can carry a load almost as well as the most competent. But a locomotive demands alertness and good judgment; a great steamship needs a highly competent captain. The automobile does not demand so much skill and judgment as a train or steamship but highly nervous people or those with what the psychologists call a slow reaction time do not make safe drivers. It is said that among colored chauffeurs a relatively slow mental response inherited from generations of tropical environment is sometimes the cause of accidents. Although no exact tests have yet been made, it is said that outside of western Europe and the United States, and perhaps Japan it is not easy to find men whose reactions are quick enough to make them safe aviators.

The management of modern transportation systems demands much higher mental types than does the actual operation. A rather ordinary man can plan the schedule of a stage coach, manage its finances, care for the horses, and do the driving. Only a man of uncommon ability can wisely manage a great railroad with its thousands of employees, its intricate relations with business, its delicate financial adjustments, its keen competition from trolley cars and trucks, and its need of keeping abreast not only of mechanical improvements all over the world, but of the rapidly changing political and business conditions. The necessity for men of unusual capacity not only as engineers, conductors and repairmen, but especially to plan schedules, meet emergencies, and plan for the future throws the more responsible positions in large parts of the world into the hands of the European races.

The Great Limitations of Modern Transportation.—In spite of clever methods adapted to almost every type of load, modern transportation, even in progressive countries, does not serve all places equally well. High speed, huge loads, and long runs do not influence peoples' habits and progress nearly so much as does the ability to reach all parts of a region with almost equal ease, but in that respect progress is slow. The trouble is not with the means of locomotion themselves, but with the tracks, roadways and terminals. The train and trolley are limited to the track and can conveniently discharge their loads only at stations. The curves and grades of the track set limits to the size and speed of trains and to the amount that can be accomplished with a given expenditure of power and labor. The great majority of accidents arise from some defect in the track and not in the actual means of transportation; defective switches, worn rails, broken ties, grade crossings, and the switching of cars from track to track are the great causes of accidents on trains, while narrow streets, blind intersections, and crowding of vehicles are the chief causes with automobiles. The steamship can go anywhere over the broad ocean but demands elaborate terminal facilities which can be profitably built only where harbors exist by nature or are constructed by man. Ships are not limited in size by difficulties of construction so much as by shallow channels and inadequate docks. Even at a great port like Liverpool the fact that large ships must wait outside the harbor until the tide rises high enough to provide a deep channel costs hundreds of thousands of dollars each year. Moreover, ships are almost useless unless supplemented by land transportation. The automobile and motor truck travel more freely than the train or the trolley car, but are greatly limited by the roads. Motor roads are often almost as distinct as railroads; if a road falls below a certain standard of smoothness and hardness its motor traffic is limited, the expense for repairs on cars mounts up enormously, and the size of the loads and the speed of locomotion fall correspondingly. Out West this limitation is locally recognized when people speak of

10-mile, 15-mile or 30-mile roads, depending on how fast an automobile can safely traverse them. It should be noted, however, that more vehicles can pass over a given stretch of crowded road per hour at a slow rate than at high speed. This is because at low speed the vehicles can be close together, not more than 15 feet apart at speeds of 10 or 15 miles per hour. At speeds of 25 or 30 miles about 60 feet is as close as is safe.

At first thought the airplane seems free to travel everywhere, but its freedom is limited to the air. As soon as it tries to land it requires a large area and very special conditions. The difficulty of landing from airplanes is eliminated in part by the helicopter, a horizontal fan which propels the airplane upward, keeps it stationary at one level, or allows it to descend at any desired rate. But the helicopter is extremely expensive and its weight reduces the carrying capacity of the airplane, which at best is slight. Hence, except in war, the chief functions of the airplane thus far are to carry mails and passengers where speed is more important than expense, and perhaps to bring within easy access remote places like tropical plantations where there is not traffic enough to pay for railways or automobile roads. The importance of landing facilities illustrates the fact that the more highly specialized transportation becomes the more it is limited to special tracks or terminals. The old-fashioned horse and wagon are freer in their movements than any modern device, the pack horse is still freer, and the man with a pack on his back is freest of all.

The Importance of Roads.—The preceding paragraphs show that good, cheap roads and convenient terminals are two of the greatest problems in transportation. If roads for heavy motor traffic could be constructed cheaply, and if the crossings, grades and curves permitted high speed without danger, business would receive a wonderful impetus, and the congestion of great cities would be much relieved. Motor vehicles are relatively so cheap that in Iowa, for example, there is one for every five persons and in some counties of Kansas one for every three, although the figure for the whole state is six. Hence, the need of good roads is increasing far faster than the roads are being built. In congested regions the use of motor vehicles is hampered even more than in the country, not only by the great expense of building roads that will stand the traffic, but by the crowding of the streets. Many people believe that some day a great system of broad highways for fast motor traffic will radiate from each city, and all grade crossings of railways will be eliminated. Separate roadways for traffic in each direction and for trucks and lighter traffic are desirable, but are far too expensive except under special circumstances. Such a system of specialized roads, together with abundant good, but less pretentious roads in the suburban and rural districts would probably do more than railroads and trolley cars have done to spread cities over wide areas and permit people to live in separate houses, surrounded by trees, grass, and flowers. In Philadelphia and Chicago, for example, the beginnings of such a system already help to relieve congestion. They permit business to be profitably located at a distance from the railroads and the main centers, and allow people to live in the country and yet get easily to their work. Thus rents are reduced, people's health is improved, and children grow up better and stronger than in the present congested cities.

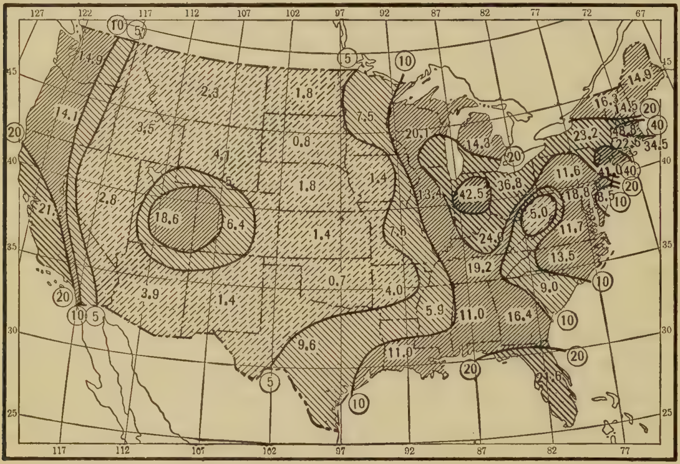


Fig. 33.—Percentage of Surfaced Roads in the United States, 1919.

The Cost of Good Roads and the Problem of Trucks.—Fig. 33 shows the percentage of improved roads in each of the states. The percentages range all the way from less than 1 per cent in Oklahoma to nearly 50 per cent in Massachusetts. But "improved" does not mean "good." Many an improved road has merely received a top coating of gravel, or is a cheap macadam full of holes and in dry weather worse than a good dirt road. Yet in the entire United States only 12 per cent of the 2,500,000 miles of road are improved even to this extent, while not one per cent are really good. The main reason why good roads are still scarce is their cost. Even with our present poor roads the total annual expense of making and maintaining the roads in the United States is about $300,000,000, which amounts to $10 per mile and $3 per inhabitant. In states like Massachusetts and

California this rises to $30 per mile. Yet even in those states the motorist is greatly hampered by the absence of made roads in many sections, the narrowness of many roads that are otherwise excellent, and above all the appalling rapidity with which good roads are pounded to pieces by heavy trucks. For example, near Boston a road leading to the summer resorts on the South Shore is sometimes traversed by 1200 automobiles an hour for twelve hours at a stretch; that is, an average of 20 a minute and a maximum of something like 40 a minute. But that road is only 40 feet wide, and the expense of widening it prevents this much needed improvement. Again, between New York and Philadelphia there is perhaps the heaviest motor truck traffic in the world. All day and especially all night when the roads are relatively free from other traffic, huge trucks rumble and jolt. They hammer the roads to pieces so rapidly that some parts of the route are almost always very rough while several detours are usually necessary where repairs are in progress. In spite of the bad roads the truck traffic of the United States is rapidly increasing. In 1920, the motor freight traffic amounted to something like two million ton-miles.

The cost of good roads is so enormous that many people are in despair. Suppose such a state as Ohio were to treat half of its 116,000 miles of road as the 28,700 miles of road for which the Federal Government was supplying aid at the beginning of 1922 were being treated. This would be enough, for it is estimated that 20 per cent of the total mileage of all highways outside of cities carries 90 per cent of the traffic. The number of miles of various kinds and the cost would be approximately as follows:

Per Cent.	No. of Miles.	Kind of Treatment.	Cost per Mile.	Total Cost.
1	1,160	Brick	$50,000	$58,000,000
8	9,280	Concrete	40,000	371,200,000
2	2,320	Bituminous concrete	32,000	74,240,000
3	3,480	Bituminous macadam	30,000	104,400,000
2	2,320	Waterbound macadam	18,000	40,760,000
17	19,720	Gravel	10,000	107,200,000
5	5,800	Sand clay	8,000	46,400,000
12	13,920	Earth	8,000	111,360,000
50	58,000	Little used roads, not treated	....	....
100	116,000		....	$1,003,560,000

If 15 per cent be allowed for interest, sinking fund, upkeep, and replacement, the annual cost would be $150,000,000, which is $26 per person, or over $200 per automobile owned in the state, or six times what was spent on rural roads in Ohio in 1921. A billion for one state is enormous, but an equal sum has been invested in Ohio in privately owned railroads and trolley lines. If the whole United States should be covered with a network of good roads, such as is suggested above for Ohio, the total investment would be about 24 billion dollars, while the present investment in railroads is about 20 billion and in trolley lines 5 billion. By far the most damage to roads is done by heavy trucks, and these create the most difficult feature of the problem. It is estimated that the daily cost of operating an average freight truck, including drivers, repairs, tires, gasoline, and oil is about $25 or $30 per day. Experiments indicate that the operating cost per mile on a hard smooth pavement is approximately one-half of the cost on an ordinary earth road. If each of the 100,000 trucks in Ohio saved $3 per day for 250 days per year by having such a system of roads, this would amount to $75,000,000. If each of the 500,000 automobiles save $50 per year in time, repairs, gasoline, and oil, it would make another $25,000,000, leaving $50,000,000 or $10 per person to be saved otherwise. How great the savings would really be, and how far it would pay to spend so much on roads is still uncertain. Nor is it yet possible to make reliable estimates as to how much the community would save in (1) the relief to the congestion of cities, (2) the gain to the farmers in taking their produce to market, their children to more centralized and hence better schools, and their whole families to the social gatherings whose rarity has hitherto been one of the great disadvantages of farm life; and (3) the gain of the manufacturers who could find cheap sites where coal and raw materials could be procured as cheaply as in the cities, and where their workmen could have country homes and gardens. The building of such roads will take decades, but a good start has been made. The work will be hastened if cheaper methods of building durable roads are invented. Good roads will not completely solve the transportation problem, for the cost of motor vehicles, the diminution of the supply of gasoline, and many other factors enter into the matter. Nevertheless good roads are among the greatest influences in promoting prosperity, in creating business, and in advancing civilization.

The Succession of Transportation Problems.—Each period in history has its own special problems in transportation. At the beginning of the last century horse-drawn vehicles were the chief means of transportation on land. Therefore the chief problem was good wagon roads. Macadam and Telford became famous by making roads which were hard, smooth, and durable under the wear of horse-drawn vehicles. Then an era of canal-building began. It was checked, however, by the invention of the steam locomotive. Canals could not compete with railroads, partly because they were almost limited to level regions, while the railroads could penetrate among the hills. The Erie Canal, which had been expected to solve many problems of transportation, gradually declined in usefulness. Some canals, such as the one from New Haven to Westfield near Springfield, were abandoned and their beds were actually used for railways. For a while the railways prospered greatly and the transportation problem was thought by many people to be solved.

The electric trolley car introduced a new factor. It took from the railroads much of their profitable suburban passenger traffic, and then invaded their interurban traffic and even their express and freight traffic. Geographically, however, the trolley lines were limited to places where the population was dense. There they prospered greatly, but in many places their promoters overshot the mark and built lines where the population was not dense enough to support them.

Next the automobile was invented. It quickly began to compete with the trolley lines and greatly diminished their profits not only because people rode in their own cars, but because jitney lines were established. When the auto-truck came on the scene, its greater freedom of movement enabled it to obtain much of the express business which the trolley lines had built up, and helped to put many of them into financial straits. It also began to compete with the railroads and to increase their financial troubles. The auto-truck, like all its predecessors, is reaping a rich harvest for a time, but it is in danger of overreaching itself. Today in well populated areas like New England it costs from 15 to 50 cents per ton-mile to ship by auto-truck, and only from 5 to 6 by rail including trans-shipment. Nevertheless, the convenience of the truck, the diminution of breakage, and the promptness of the service make people willing to pay the higher rate. The trucks, however, tend to defeat their own object; they spoil the roads thus causing delay, and raising the cost of auto truckage by increasing the expense of maintaining the vehicles under the rough usage of the poor roads.

Another mode of conveyance, the airplane, has yet to show what it will do. Thus far it promises only to supplement the railroads by carrying passengers, mail and light express matter for which great speed is especially urgent.

Let us sum up the different types of land transportation by showing the geographical conditions to which each is best adapted. The horse now finds his chief use in carrying small loads short distances in cities, in working on farms where there is not enough work for tractors or the ground is too rough or soft for them, in hauling loads or working as a pack animal in rugged and sparsely settled regions where the population is too sparse to support good roads or too backward or inert to accumulate the capital needed for good roads. Trolley cars are chiefly adapted to regions almost the opposite of those where the horse is still used. They find their chief field in transporting the dense population of industrial centers where people of moderate means do not own automobiles and where the distance from home to work is rarely over six miles. Where interurban trolley lines connect cities they assume almost the character of railroads.

The automobile finds its chief sphere among fairly prosperous people, especially where the population is dense enough for good roads, but not so dense as in the regions where trolley cars are most profitable. The automobile regions include the outer and more prosperous suburbs of cities, and the prosperous farming regions where the land is level. The auto-truck is the freight carrier of the city, and is fast becoming the freight carrier of the farmer and of all sorts of business for distances up to 50 or 100 miles in densely populated regions, and for much longer distances where the population is too scanty to support railroads. Its greatest value lies in its reduction of trans-shipment. Its future depends on the roads. Its companion on the farm is the tractor which is adapted to level land, large farms, and rich soil.

The place of the railroad is not yet wholly clear, for the railroad is the means of conveyance whose functions have been taken over by the newer inventions. The railroad, however, shows little sign of losing its place as the carrier of freight and passengers for distances over 40 and in some cases 250 miles, although that work is taken by the automobile in sparsely settled places, in recreation centers, and in some other cases. Finally the function of the airplane is to carry passengers and valuables at high speed even where trains are available and also in places where neither roads nor railroads are well developed.

Relation of Transportation and Communication.—Rapid and exact communication is as important as rapid and safe transportation. The two have grown up together and can scarcely be separated. On the whole, however, communication is farther advanced than transportation, for it is less hampered by geographical conditions. A mail route can be established among mountains where a railroad or even a good automobile route would be too expensive because of the sparsity of population. Even where the mails are carried by very primitive modes of transportation such as dog teams and reindeer in Alaska, pack horses in Asia Minor, and yaks among the Himalayas the regulations as to the care and cost of the mail service are almost as highly developed as in places where express trains are used. It is a noteworthy fact that in backward countries like Turkey, the mail service is safer and more like similar services in advanced countries than almost any other work of the government. Of course the mail may arrive only once a week on the Yukon or once a month in Persia, but even in such remote places the mail is an international matter, and is regulated by strict agreements identical in all countries.

What is true of the mail is largely true of the telegraph. Geographical conditions interfere relatively little with telegraph and telephone lines. Of course it is more expensive to lay a cable under the Atlantic or run a wire across the Caucasus than to string a hundred wires across Indiana where the plain is level and wood for poles can be had not far away. Nevertheless when the cable or wire is once laid, the interruptions to telegraphic or telephonic communication by wind and storm are far less important than the interruptions to transportation in the same regions. One of the most formidable difficulties in communication is the extreme complexity of telephone exchanges, and the fact that the more extensive the service the greater the cost of each individual telephone. The system of exchanges without operators, however, removes part of this difficulty, for each user of the telephone does his share of the work.

The wireless telegraph and telephone reduce the importance of geographical conditions almost to the vanishing point. Except for the temporary interruptions by electrical storms or by atmospheric disturbances which occur by day much more than by night, an explorer in the forests of Africa or the great desert of Arabia can communicate with the rest of the world, with comparative ease at almost any time. A recent explorer in the northern Amazon region talked with Panama every day. The one thing that is lacking in order to make communication practically perfect is the ability to see the face of the person who is talking, but even in that direction the first steps have been taken. To sum up the whole matter, modern communication, unlike transportation, can penetrate anywhere at any time, and can give almost perfect opportunities for the exchange of ideas without being hampered by the need of elaborate terminals and expensive roadways. Terminals are indeed necessary, but are relatively small so that they can be set up almost anywhere.

Such perfection of communication may perhaps be a forerunner of similar perfection of transportation. At any rate good means of communication are one of the most important aids to transportation. Without the telegraph it would never have been possible to run fast trains at frequent intervals over the railroads. And wireless telegraphy and telephony make transportation by sea and in the air far safer than hitherto. The telephone and telegraph also replace millions of letters, and save the necessity of millions of miles of travel by business men. They also prevent much waste. For example, carloads of perishable fruit are sometimes saved by diverting them from their destination to a better market through the use of the telegraph.

EXERCISES AND PROBLEMS

1. A summary of the distribution of facilities for transportation in the United States. Make a table showing (*a*) the states which stand first, (*b*) second, and (*c*) third, and (*d*) the rank of your own state in each of the conditions shown in Table 37 and in Fig. 33. Note that in some cases a high figure means first and in others a low figure. In which of the twelve conditions which you thus tabulate does the rank of a state depend largely on its area or on its large population? In what other conditions does high rank depend largely on the position of a sparsely populated state between more important centers of population? Explain how this causes certain states to appear to be unusually well supplied with transportation facilities even though they are states where one must sometimes travel a hundred miles by road or even a score of miles on horseback in order to reach certain portions.

When all these conditions are eliminated there remain five conditions which are especially good evidence as to the ease with which people can reach all parts of a state either in person or with messages. What are these five? Shade a map of the United States as follows: (*a*) heavily, any states that appear three times as ranking first, second, or third in any of these 5 conditions, (*b*) moderately, those appearing twice, and (*c*) lightly, those appearing once. In which of these states would the density of the shading be increased if we were to pick out the three having the best facilities for transportation by water? In order to judge of this consider length of coastline compared with the area of the state, number of good harbors, and inland waterways including lakes, navigable rivers, and canals.

What northern or southern states are shaded on your map? What states would have to be shaded in order to have a complete band cross the country? How do they rank and why are they missing? Explain how your map shows the effect of (*a*) relief, (*b*) density of population, (*c*) other geographic factors.

2. Make a table like that of Exercise 1, except that you use the three states standing lowest in facilities for transportation and communication. Above the columns in which you write the names of the states put the numbers 46, 47, 48, the last being the lowest. Where several states have the same figure put them all in. On the map made in Exercise 1, insert three grades of shading for the present table, but use some other color. Explain the physical conditions which especially hamper transportation and communication.

Two states are shaded in both colors on your map. What conditions help to explain why the same states stand high in one of the requisites for a good transportation system and low in a closely allied requisite?

3. Describe the facilities for transportation and communication in your own state. Compare your state with the states which stand highest and lowest in Exercises 1 and 2, respectively. What geographical conditions chiefly help or hinder transportation in your state?

4. Repeat Exercise 1, but instead of the states use the countries of the world as given in Tables 33 and 34. In preparing your final table showing the degree of progress in transportation and communication, use Cols, C, F, and H, Table 33, and B, D, and H, Table 34. Put the rank of the United States in the last column instead of the rank of your own state. What three general regions are shaded on your map? Give as many reasons as possible for their high rank. In what respects does the United States fall farthest below some of the other countries?

5. Compare the transportation facilities of the states that appear in the table prepared in Exercise 1, with the countries in the table of Exercise 4. To do this arrange the three highest countries from Col. C, Table 33, and the three highest states from Col. C, Table 37, in order according to their rank. How do the highest states compare with the highest countries (*a*) in railway mileage per 1000 square miles, (*b*) in area (Table 1), and (*c*) in population (Table 1)? Make a similar comparison between the three highest in each of the following pairs of columns: Table 34, B, and 37, H; Table 34, D, and 37, J.

If data for canals, improved roads, telegraph messages, and coasting vessels were available we should find that several European countries excel any of the states in these respects.

CHAPTER IX

THE DISTRIBUTION AND PROBLEMS OF POWER

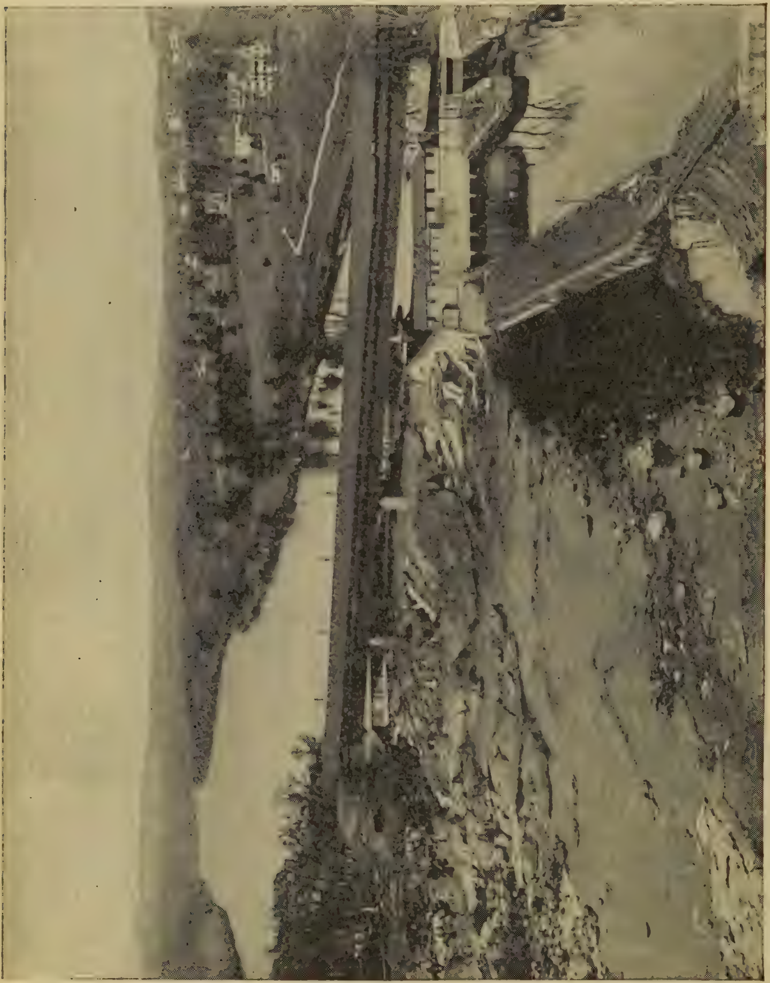
The Sources of Power.—The chief sources of power are coal, moving water, petroleum, animals, wood, wind, and natural gas. To begin with the least important, natural gas and wind are used only locally and their use tends to decline. In backward regions wood is still the main source of heat for domestic purposes and an important source of power for manufacturing and transportation. In more advanced regions its great value for other purposes has almost put an end to its use to generate power for manufacturing. In spite of the great increase in gasoline engines and tractors, animals are still the main source of power for transportation on farms even in progressive countries and for all sorts of transportation away from railroads in backward countries. Their use, however, belongs primarily to agriculture. At the present time petroleum, especially in the form of gasoline, or petrol, as the English call it, takes high rank as a source of power. Nevertheless, in 1922 it furnished only about 3 per cent of the power used industrially in the United States, and its importance dates back only to the beginning of the present century when explosion engines first became common. Moreover, according to the geological experts, the supplies are being exhausted so rapidly that within a generation or two petroleum as a source of power may once more be insignificant. Nevertheless, it will leave behind it the legacy of the light, high-powered explosion engine which has been the main factor in the development of both the automobile and the airplane.

This leaves water and coal as the two main sources of power. The Romans are said to have been the first to apply water power to flour mills. The Domesday Book shows that England was full of water mills at the time of William the Conquerer, about 1066, the number being some five hundred in Norfolk and Suffolk alone. In 1920 water furnished about nine million of the horse power used in the United States, while coal supplied 33 million, and gas and oil one million. These figures do not include locomotives and automobiles. In the future the use of water power will probably increase rapidly, for among the sources of power now commonly in use water is the one whose supply is least in danger of exhaustion.

The Relation of Power to Progress.—Although the steam engine was used somewhat before 1800, it was not employed extensively until the early part of the nineteenth century. Since then steam power has influenced modern industry and transportation so profoundly that many people have supposed that coal, the chief source of power, is actually the cause of manufacturing and that manufacturing is the primary cause of progress in civilization. This mistake should be carefully guarded against. The power derived from coal did not cause England, for example, to become a leader in manufacturing and commerce. Before the invention of the steam engine England was already the world's leader in both respects. English cutlery, made by hand, was famous in many countries. English cloth, likewise made by hand, was also widely known; and English tools and machines were the best to be had. At the same time English ships were sailing to all parts of the world, and then as now were the most noteworthy carriers of commerce. Next to England in these respects came the neighboring countries bordering the North Sea, including Belgium, France, the Netherlands and Germany. Switzerland, too, was famous for its fine clocks and watches, its cotton cloth, and its silks, just as today. In the New World before the time of the steam engine, New England was the chief manufacturing center; cotton from the South was shipped to that section and the finished product shipped back again much as at present. Commerce, too, was active from Boston to Baltimore, and languished farther south. In short, except for almost uninhabited regions to which Europeans have since migrated—for example, the United States west of the Appalachians—the general centers of industry and commerce were then almost the same as now.

Then came the steam engine. Its use in manufacturing stimulated the growth of old cities and caused new ones to spring up; its use in transportation tended in the same direction and shifted ocean commerce from the small shallow ports to the large ones with deep harbors. Nevertheless, the general regions which had formerly been most active in manufacturing and commerce still maintained their supremacy. Switzerland, for example, had no coal, but it felt the stimulus of steam power almost as much as did England. So too with the Netherlands, whose ships obtained their coal from England; and with New England, whose manufacturers brought coal from Pennsylvania, 300 to 500 miles away. Even today great numbers of New England factories are located near the waterfalls and rapids which first turned their wheels, although 75 per cent of their power now comes from coal.

The Real Part Played by Power in Manufacturing.—The real function of coal, water, or any other source of power may be understood from an illustration. Suppose a score of cabinet makers are at work, each in his own shop. All are making tables by hand, but some build square-cornered tables of undressed pine, others construct carefully dressed pine tables with legs turned in a foot-power lathe, and still others are carving and polishing beautiful tables of hard walnut and mahogany. Each does his best, but none has good tools. Now suppose one of the most skillful cabinet makers invents a power lathe run by a waterfall. What will be the effect? The owner of the lathe will make more and perhaps better tables than before. The other



Courtesy of Amoskeag Mills.

FIG. 34.—Water Power Development on the Merrimac River at Manchester, New Hampshire.

men who are equally skilled will either set up lathes if they have water power, or will hire the owners of the power lathes to do their turning for them. The man who is only skillful enough to make undressed tables with square legs will not bother about the new invention even if he has a fine waterfall of his own.

This illustrates what happened when the steam engine was invented. The people who were already skillful and who had coal of their own soon profited greatly. Belgium, northeastern France, western Germany, and Pennsylvania were the chief regions of this kind aside from England. Other skillful people who had no coal began at once to import it. Switzerland, Sweden, and New England are among the chief examples of this type. The moderately skillful manufacturers in Italy, Spain, Russia, and Louisiana imported or mined what coal they needed, but did not increase their manufactures nearly so rapidly as did the regions where manufacturing was previously well developed. The unskilled manufacturers of China, India, and Siberia, even though having fine supplies of coal, paid no attention to the new methods until the people from the more highly developed regions forced them to do so. The presence of coal or any other source of power has never made any nation civilized, nor has it greatly changed the *relative* positions of the nations in manufacturing or commerce. It has, however, greatly stimulated the countries that were already active

No source of power illustrates this better than petroleum. The United States happens to be the world's chief producer and chief consumer. But some of the largest consumers are Great Britain, Germany, and France, all of which have only scant supplies within their own territory and in the regions which they control politically. Although the entire British Empire, previous to the British mandate over Mesopotamia, produced less than 1 per cent as much oil as the United States, Great Britain equipped many of her naval vessels as oil burners. She knew that the energy of her people would secure the oil, though it might come from backward regions in Mexico and Russia. Thus the progressive countries are stimulated by the discovery of new sources of power, even though those sources lie outside their own territory.

The Relative Distribution of Coal and Manufacturing.—The relative distribution of coal and of manufacturing is well illustrated in Figs. 35 and 36. The first of these shows the value per capita of the manufactured products in the various states. The per capita value added by manufacturing (Table 31 K) is a still more accurate test of the intensity of manufacturing, and a map of the percentage of the population engaged in manufacturing (Table 8 E) affords an equally good test. The resemblance of all these maps to the maps of progress

(Fig. 22), health (Fig. 21) and climatic energy (Fig. 23), is so close that the connection of the whole series can scarcely be doubted. On the other hand, Fig. 36, showing the amount of coal mined per capita in the various states, is wholly different from the other maps. It seems to have no connection with them.

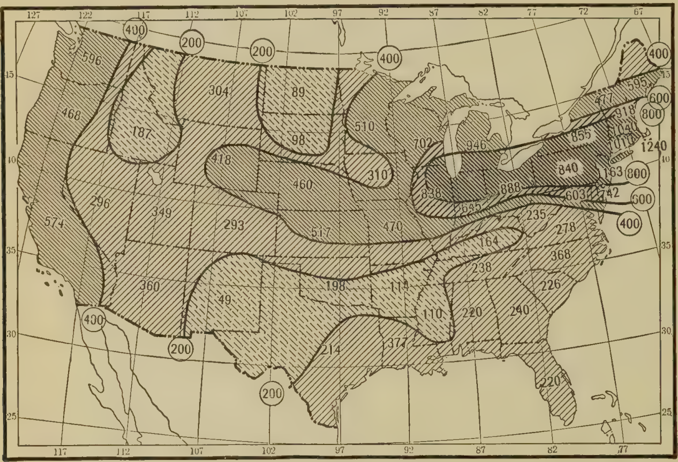


FIG. 35.—Per Capita Value of Manufacturing in the United States.

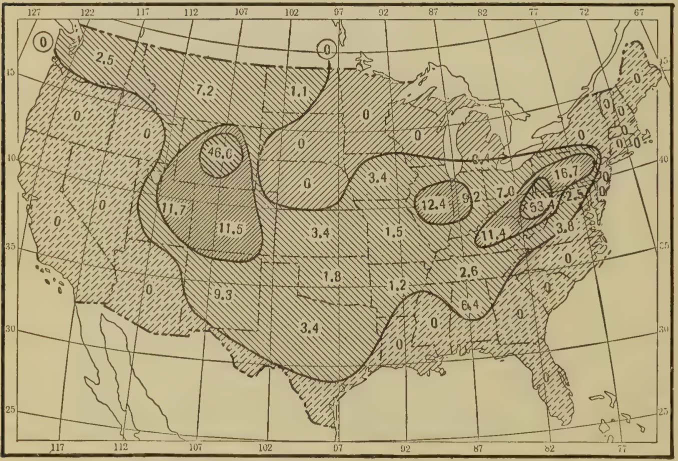


FIG. 36.—Per Capita Value of Coal Mined in the United States.

In view of the common opinion that the distribution of manufacturing depends on the distribution of coal, it is worth while to test this by the strict mathematical method of correlation coefficients. By this method mathematicians determine whether any two sets of phenomena are really related. If one phenomenon varies exactly with the other, as the length of the day varies with the noon-day distance of the sun from the zenith, the correlation coefficient is 1. If there is no relation whatever the coefficient is zero. But suppose two things have a relation like that of the corn crop and the summer rainfall, where the amount of corn depends partly on the rain, but also on other things such as temperature and insect pests. In that case the correlation coefficient is between one and zero and is expressed as a decimal. Applying this exact method to a comparison between the amount of coal mined per capita in the various states and the value per capita added to manufactures in 1909, the correlation coefficient is −0.009. This is practically zero, and means that there is no real connection. The presence of coal determines the *kind* of manufacturing, for heavy iron goods such as steel rails are sure to be manufactured as near the coal as possible, but the coal does not determine the *relative amount* of manufacturing. The use of coal has indeed increased the total volume of manufacturing enormously but its effect has been as great in New Hampshire or Switzerland as in Pennsylvania or England.

This can be better understood by rearranging column K in Table 31, so that the states stand in order according to the value per capita added by manufacturing in 1919, and then placing opposite each state the amount of coal per capita. The first four states mine no coal whatever. Then comes Michigan, which ranks only twenty-third in coal mining per capita, and Ohio, which ranks twelfth. Although Pennsylvania mines far more coal than any other state, its production *per capita* is less than that of West Virginia or Wyoming. To the people of those states their coal mines are actually more important than are the far larger mines to the far larger population of Pennsylvania. But West Virginia stands only twenty-fourth in the amount of manufacturing per person and Wyoming adds less value per capita by manufacturing than any states except New Mexico and the Dakotas. Again, Alabama not only stands fourth in its production of coal per inhabitant, but also has good iron ore. Yet in manufacturing it stands only thirty-eighth. Many other instances might be cited to show the same lack of agreement between the distribution of coal and of manufacturing. Switzerland, Sweden, and Denmark are all examples. Although Denmark is primarily an agricultural country and has practically no minerals, it has as large a proportion of people engaged in manufacturing as has the state of Pennsylvania with its wonderful supplies of coal. Switzerland, with equally scanty natural resources and with no coal, has a relatively larger manufacturing population than any American state, including even Rhode Island.

The Geographical Relations of Water Power and Manufacturing.—The principles that apply to coal apply also to water power, but with the important difference that hydro-electric power cannot yet be economically transported nearly so far as coal. Four hundred miles is at present about as far as is advisable, and even at that distance there is much waste. The following table illustrates the matter. Column A shows the distribution of the 28,000,000 horse-power which the Geological Survey estimates to be available in the rivers of the United States by their natural flow, exclusive of additional power which may come from reservoirs. Column B gives similar facts for the 54,000,000 available at high water and by means of reservoirs. The Pacific States have far the largest supply because of their high mountains and abundant rainfall, especially in western Oregon and Washington. Then follow the Rocky Mountain States because of their mountains, the South Atlantic States from Delaware to Florida, and the Middle Atlantic States of New York, Pennsylvania and New Jersey. Column C shows the amount of water power actually developed. Here the order is wholly different from columns A and B. New England stands little below the Pacific states, although it comes third from the lowest in actual amount of available water power. Column C shows clearly that water power is most fully developed in the northeastern manufacturing region. New England stands highest because (1) it began to manufacture before coal became the chief source of power; (2) it has no coal; (3) its glacial topography and moderate ruggedness make the development of water power especially easy; (4) it has abundant rain at all seasons; (5) its population is dense; and (6) its people are among the most skillful in utilizing their resources.

WATER POWER IN THE UNITED STATES, 1917

Division.	Potential Water Power.		Installed Capacity of Water Wheels, H.P.	Percentage of Maximum Utilized.	Amount Used per 1000 Inhabitants, H.P.
	Minimum, H.P. *A*	Maximum, H.P. *B*	*C*	*D*	*E*
New England	868,000	1,605,000	1,381,000	86	187
Middle Atlantic	1,357,000	2,488,000	1,735,000	70	76
East North Central	832,000	1,604,000	812,000	51	38
South Atlantic	2,346,000	4,257,000	1,381,500	32	99
West North Central	902,000	1,956,000	503,400	26	40
East South Central	1,087,000	1,964,000	504,500	26	57
Pacific	11,504,000	23,078,000	1,893,000	8	340
Mountain	8,694,000	16,131,000	1,006,600	6	397
West South Central	353,000	822,000	25,700	3	2½
Total	27,943,000	53,905,000	9,242,700	17	138

From World Atlas of Commercial Geology, 1921.

In the Middle Atlantic and East North Central States, which together extend from New York to the Mississippi River, the slight importance of the first three reasons partly explains why the water power has been less developed than in New England. On the other hand, since these states contain the country's finest coal and have especially easy natural means of transporting it on the lakes, over the plains, and down the Ohio River, it is surprising that they should have developed their water power so much more fully than any other part of the country except New England. In the West, because of the newness of the country and the sparseness of the population, only a small percentage of the abundant water power in the Mountain and Pacific States has yet been devoted to manufacturing, but a good deal is employed in transportation, lighting, and farm work. The amount used per inhabitant, as appears in column E, is much greater than in New England. The great contrast between New England, with its relatively small supply of potential water power and with about 20 per cent of its people engaged in manufacturing, and the Pacific States, with their enormous potential water power and great use of that power per inhabitant, but with only about 5 per cent of the population engaged in manufacturing, illustrates the fact that the location of water power, like the location of coal, does not determine the general location of either manufacturing or progress. Because the Pacific and Mountain States are inhabited by energetic and capable people they are constantly using their water power more and more fully for manufacturing, but that is a result of their progress quite as much as a cause of it.

In foreign countries the same principle holds true. In few other regions is there such an enormous supply of water power so easily available as among the Himalayas, while the gentle topography of England causes its water power to be very slight. Yet the Himalayas and neighboring parts of northern India have no extensive manufacturing, while England was busily harnessing its water power a thousand years ago. Again Portugal has splendid water power and might almost rival Switzerland in its use for manufacturing. Denmark, on the contrary, has almost none. But Denmark's manufactures now, and for decades, have far exceeded those of Portugal.

The Problems of Power.—(1) *A Substitute for Petroleum.*—The enormous development of manufacturing and transportation during the past century makes the problems of power peculiarly important. Four of the chief problems are (1) the production of cheap and efficient substitutes for petroleum; (2) the more effective utilization of water power; (3) the more economical utilization of coal; and (4) the discovery of new ways of procuring power cheaply and permanently.

These are arranged in the order of their immediate urgency. All must be solved within a few generations if progress along present lines is to continue.

The petroleum problem must be solved at once or grave consequences will follow. The gravity of the situation depends on two factors: (*a*) the enormous increase in the use of petroleum and (*b*) the extreme limitation of the petroleum supply. The increased use of petroleum may be judged from the following figures showing the net increase in the number of automobiles registered in the United States. The actual number was less because some cars were registered in one state and then sold and registered in another state, while some were destroyed.

1913	1,258,002
1915	2,445,664
1917	4,983,340
1919	7,565,446
1921	9,195,404

The use of petroleum in ships and airplanes and for many other purposes is also increasing rapidly. In fact the convenience of petroleum leads to inadvisable though convenient practices, such as its use for heating buildings.

The facts as to the supply of petroleum demand even more attention than those as to its use. Here is the production per decade in the United States and the percentages of increase over the preceding decade:

Decade.	Production in Barrels.	Per Cent of Increase.	Barrels Used per Capita at End of Each Decade.
1861–1870	32,500,000	...	0.13
1871–1880	115,000,000	350	0.52
1881–1890	293,000,000	250	0.72
1891–1900	553,000,000	190	0.83
1901–1910	1,375,000,000	250	2.32
1911–1920	3,051,000,000	220	4.27

Since 1861, which was the beginning of important production, the United States, which furnishes two-thirds of the world's supply, has produced 6,000,000,000 barrels, or about 50 per person for the present population. In 1920 the geologists estimated that the known reserves of oil underground amounted to only about 80 or 90 barrels per person. Since we are now using six barrels per person each year, the visible supply will scarcely last till 1940, even though the use does not greatly increase. New discoveries may prolong this period, improved methods of pumping and handling the oil will also help, supplies can be procured from other countries, and oil shales such as those of Colorado can be worked, but even with the fullest allowance for all these factors, unless drastic measures of conservation are taken, it seems almost certain that by 1950, when many readers of this book are at the height of their careers, the world's supply of petroleum will be reduced to small proportions. Even now the general upward trend of prices is alarmingly rapid. In view of these facts the use of oil in ships and locomotives, for example, is a penny-wise, pound-foolish policy. It pays the oil producers; but in the long run it harms the country and does irreparable damage to future generations.

Among the common uses of petroleum there are two where substitutes should be employed at once, (1) for automobiles and other explosion engines, and (2) for lighting and cooking in homes. Wood alcohol serves almost as well as gasoline in explosion engines. If it were manufactured on a large scale, automobiles could easily be adjusted to use it. In fact it is actually used in France and also in Cuba where it is made chiefly from " blackstrap " molasses, an end product of sugar making. Great fortunes will probably soon be made by installing alcohol plants on so large a scale that the product can be sold everywhere in competition with gasoline. But the production of wood alcohol involves difficult problems of transportation, and threatens further inroads on our depleted forests. Nevertheless, alcohol can be made from many kinds of vegetation which now go to waste or are uneconomically burned,—the stalks of cotton plants, the bagasse or fiber left after sugar cane has been pressed, and especially the stems of such rapidly growing tropical plants as the banana, and certain species of Filipino bamboos which in a single season may attain a height of 60 to 80 feet. Areas of small wild bamboo with an average growth of 43 feet the first season are estimated to yield enough material to make 280 gallons of alcohol per acre. At this rate an area of about 130,000 square miles which is somewhat more than the area of the Philippines and nearly that of Montana, would yield 7½ billion gallons of alcohol, the estimated equivalent of the present annual consumption of 5 billion gallons of gasoline in the United States. Perhaps one of the next great types of tropical plantations will be devoted to raising rapidly growing plants along river banks for alcohol.

To the dweller in the cities of advanced countries, the use of petroleum products for lighting and cooking seems of small importance. To country people, however, and even to the city people in large parts of the world, kerosene is one of the great necessities. Five-gallon rectangular tins, packed in pairs in wooden boxes, are shipped all over the world by the Standard Oil Company and other dealers. Hundreds of thousands of empty tins, made into buckets by inserting a solid wooden handle, testify to the enormous use of kerosene. This is not necessary, for wood alcohol might be shipped everywhere for the same purposes, and water power and coal might also be used. So long as gasoline is used for motive power, the use of kerosene for lighting is merely a means of utilizing what might otherwise be in part a waste product. But when petroleum becomes chiefly a source of lubricants, the kerosene supply will be much diminished and a substitute will be needed.

The greatest reason for conserving petroleum is that it is the source of practically all lubricants. Almost everyone knows that running an automobile without oil is one of the surest ways to spoil the machine, but few people realize that if our supply of lubricating oil were cut off, not only every automobile but every factory, railroad, trolley line, and steamship would soon be motionless. Even the wagons would creak loudly and grow hot at the axles. For a few purposes vegetable and animal oils might be used, but they are not so good as mineral oils, and for many exacting uses in high-speed machinery they are impractical. So important is lubricating oil and so completely does the supply come from petroleum that our grandchildren may speak very bitterly of our folly and barbarism in using up the good lubricant which they will need for high-speed machinery far more than we do. They may also say hard things of us because of the expense in getting such petroleum products as vaseline, paraffine, and mineral oil for medicinal use, even though oil shales are still available.

The problem of petroleum conservation is complicated by the fact that petroleum occurs only in limited localities. The owners of those localities reap immediate personal profit by exploiting them as fast as possible. So eager are they to rush the product to market that they waste from 30 per cent to 90 per cent either underground or on the surface. In a very real sense it is a great good fortune for a country like Mexico or Mesopotamia that its supplies of petroleum are only beginning to be exploited, and places like much of Africa, South America and Central Asia may prove to be still more fortunate, for they have not even been explored for oil. Before the oil in these regions is exhausted the world may come to its senses in time to prevent the complete waste of this rare treasure, but the United States, which now prides itself on having exploited its resources in the most wasteful and rapid way, will be mourning over the folly of the present generation.

(2) *The Utilization of Water Power.*—The wisdom of using water power instead of coal or gasoline is obvious. As long as the sun

evaporates water which falls upon the mountains as rain, the rivers will run. As long as the rivers run they will afford cheap and convenient power. A water power site is perhaps the most valuable real estate in the world—vastly more valuable than a gold mine. The reasons why only one-fifth of the available water power in the United States has yet been utilized include (*a*) the presence of abundant supplies of coal; (*b*) the large amount of capital needed to install water power plants; (*c*) the fact that only during the last few decades has it been practicable to convert the power into electricity and carry it long distances out of the rugged regions where it is generated; (*d*) the restrictions placed by the Federal Government upon the use of power by private individuals or corporations; and especially (*e*) the fact that three-fourths of the potential water power is in the new and sparsely settled states from the Rocky Mountains westward. The restrictions have been wisely placed in order to prevent the water power sites from falling into the hands of private individuals, but they need to be modified to encourage the use of water power instead of coal. Today the water power problem resolves itself into framing regulations that will accomplish three things: (1), make water power investments attractive to capital; (2), vest the permanent ownership in the general public; and (3), arrange a flexible scale of royalties or prices to be paid for leases of water power sites so that investors will get a fair return on their investment, while the great increase in value which is sure to come will belong to the public.

(3) *The Economical Use of Coal.*—For a long time coal will probably be the world's main reliance for heat and power. Yet if the business men of the next generation are no wiser than those of the present, the grandchildren of people now living,—even though the world's coal is by no means exhausted,—may see such scarcity and high prices that industry will be seriously hampered and millions of individuals will suffer. Civilization would probably suffer a serious blow, if people were driven out of the energizing northern climates into the relaxing warm climates where artificial heat is not needed. Just how long the world's coal supply will last can be estimated only very roughly. If the rate of use should increase as rapidly in the future as in the past and if no new supplies of great size should be discovered, the time might be only 150 years, but some estimates increase this to a thousand or more. It must always be remembered, however, that the thing that counts is not the complete exhaustion of coal, but its use to such a point that the price becomes prohibitive. That may come long before all the coal is gone.

Let us analyze some of the reasons why the consumption of coal is far greater than is necessary in proportion to the power and heat which it furnishes. (1) Coal mining is a wasteful, competitive industry, at least, in the bituminous fields. Each producer is trying to get out as much as possible in a shorter time and at a lower rate than his competitors. Hence, the waste is tremendous. Sometimes a good seam two feet thick is wasted by being allowed to cave into an abandoned mine after another one below it and four feet thick has been removed. Again, the method of mining by rooms is used instead of the "long wall" system whereby the whole length of a seam is taken out. This is done because the long wall system requires expensive artificial support for the roof of a mine, whereas the room method leaves large supporting pillars. The room method not only wastes from 20 to 50 per cent of the coal in this way but limits the use of machinery. It costs from eighty cents to a dollar per ton to shovel the coal into mine cars, while loading machines could do this for a few cents.

(2) Coal is transported far more than is necessary. In most parts of the United States and other progressive countries nothing else passes over the railways so regularly in carload lots and full train loads. The mere hauling of this coal probably consumes forty or fifty million tons of coal each year. Much of this is unnecessary. Often the coal from one field is carried almost to another, making its journey twice as long as would be necessary if the country were divided into zones and each were supplied from the nearest field. During the Great War the United States Fuel Administration saved 160,000,000 car-miles a year by a proper zoning system.

(3) Coal is used most wastefully. For example, nearly 50,000,000 tons of coke are produced in the United States each year. In 1921 about one-fifth of this was prepared in old-fashioned beehive ovens which waste the by-products. How great this waste is may be judged from the fact that one ton of bituminous coal produces only 1440 pounds of coke, the remaining weight consisting of 10,000 cubic feet of gas, 22 pounds of ammonium sulphate, 2½ gallons of crude benzol, and 9 gallons of tar. These are worth $14 for every dollar of value of the original coal at the mine, but are wasted because retort ovens are expensive and the demand for the by-products scarcely pays for the installation of retorts in place of the beehive type. If the by-products were used and if the solid part of the coal were made into artificial anthracite, which is technically possible although not yet done commercially, there would be not only a great saving in coal, but the soot and dust of our trains and cities would be greatly diminished.

A still greater waste of coal arises from the inefficiency of our steam engines. When ordinary coal is burned it gives up 70 to 80 per cent of its energy to the steam in the boiler. With powdered coal or oil this figure rises to 75–85. But the efficiency of the steam engine is so low that the work which it does amounts to only 5 per cent of the original energy of the coal in many cases and only 15 or possibly 20 per cent under the very best circumstances.

In domestic use there is likewise an enormous waste of coal. Many people light their furnace fires when they need heat only an hour or two each day, and keep them going late in the spring. If they had artificial heat only when it is really needed, their health would be improved and millions of tons of coal would be saved. Again, every industrial plant uses large amounts of coal to keep up its fires nights and Sundays, even though no work is done. This seems unavoidable under our present system, but it helps to explain why so much coal is consumed with no adequate return in the form of power.

The waste of coal is so enormous that where one horse-power or its equivalent in heat is actually used, the consumption or waste of coal underground, on the railroads, and in the furnaces is estimated as enough to furnish at least twenty horse-power, and perhaps more. Part of this waste is inevitable, although it may be much diminished when some method is devised whereby coal can be made to explode instead of burn with the consequent necessity of making steam and wasting much heat up the chimney. Nevertheless, it seems quite certain that careful methods of mining and transportation might cut the waste of coal in half. It would help toward this end if the coal business should cease to be competitive, and should be regulated for the purpose of wasting as little as possible and giving the best service to the public as well as a liberal return to investors.

Another highly important means of saving coal, and incidentally of making life cleaner and pleasanter, is by substituting a few great central power stations for the millions of little steam plants, locomotives, and furnaces which now waste so much coal. Suppose there were a few great plants scattered at intervals of a hundred miles more or less along the Atlantic Coast from Portland to Baltimore and through the manufacturing districts of the interior in positions where the cost of transportation would be a minimum. Such plants would generate electricity with far less waste than at present. They could have interlocking circuits so that if one were temporarily out of commission the others could help it. They could be supplemented by water power so that all the available energy would be used at all times. Their loads could be foretold with almost absolute accuracy at any given hour so that they could always be fed just the right amount of coal. They would be subject to no violent fluctuations such as those which cause the furnaces of an ordinary factory to be supplying almost the maximum amount of power at one moment and none at all a few minutes later after the closing whistle. Of course when work stops in the afternoon, there must be a sudden drop in the demand for power in factories, but at that very hour the trolley lines and suburban railways require a maximum; a little later the demand for light requires much power; then the many freight trains which run at night make a considerable demand, while the charging of storage batteries for all sorts of purposes, especially if it could be cheapened, would probably become much more frequent than at present, thus saving surplus power on a large scale. Just how much coal could be saved in this way cannot yet be determined, but that the saving would be enormous, especially if the most improved methods of consumption were utilized, cannot be doubted.

Such a project known as the "Superpower System for the Region between Boston and Washington" has been carefully worked out by the United States Geological Survey.* (See Fig. 37.) The plan contemplates a main electric power line running between these two cities. Into this will feed all the isolated power plants now run independently and at considerable waste. If the plan should be adopted, users of power would not hereafter develop their own supply, but would tap the main power line. It is estimated that the plan could be completely installed within ten years and that it would save about 50,000,000 tons of coal per year, as follows:

Saved by electric utilities	19,149,000	short tons
Heavy traction railroads	10,210,000	" "
Manufacturing industries	20,625,000	" "

To hope that by such methods the use of coal may some day be cut in half seems not unreasonable. The amount of saving depends largely on the extent to which people can get together and carry out great cooperative enterprises with the assistance of the government without the private jealousy and greed and the political inefficiency, waste, and often corruption, which spoil most attempts at cooperation.

(4) *New Sources of Power.*—One of the greatest differences between a grown person and a child is that the child looks only at the present while the grown person looks ahead. Between people with poor minds and those with strong minds there is the same difference: the dull incompetent person looks only at tomorrow or next week; the competent person looks at next year. The highest type of all looks ahead

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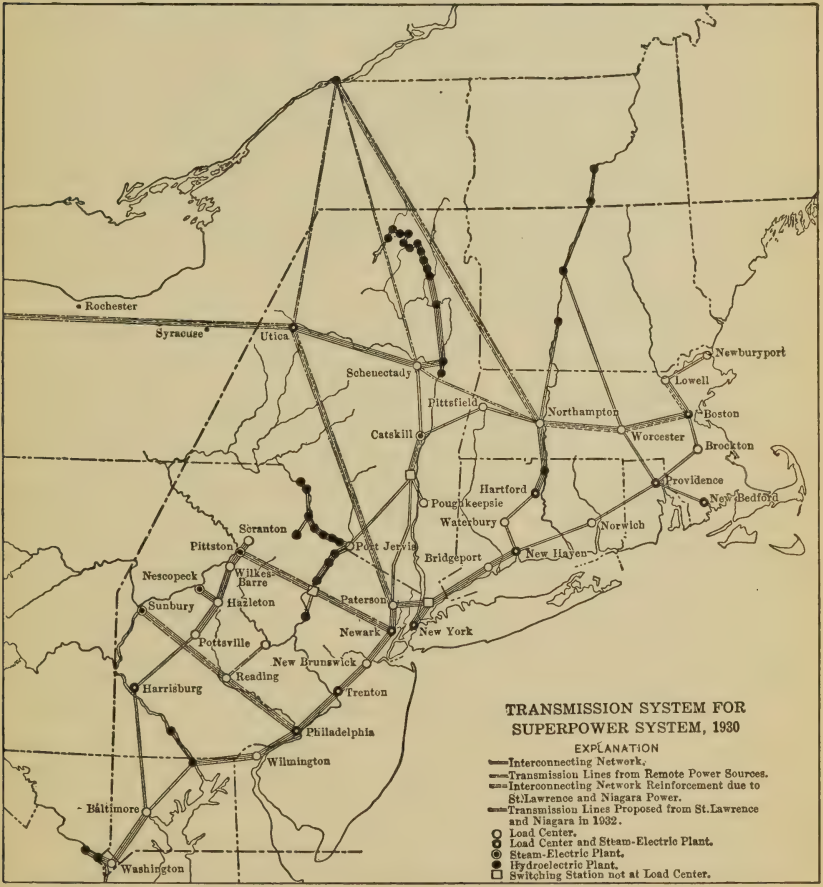
* Professional Paper 125, U. S. Geol. Survey, 1921.

for decades and centuries. One of the probabilities of the future is that no matter how well we conserve our coal and utilize our water power the demand for power will necessitate other and ampler supplies. Four sources have been suggested. One is the wind. In the aggregate the power of wind vastly exceeds that of water. Its inconstancy, however, has caused the use of windmills to decline quite steadily during recent decades and this difficulty seems insuperable until some very cheap storage battery or other means of storing power is devised.



Courtesy U. S. Geological Survey.

FIG. 37.—Power Plants and Transmission Lines of a Proposed Superpower System in the Northeastern United States.

Other possible sources of power are the internal heat of the earth, the heat of volcanoes which is actually used to a slight extent near Naples, the tides, and the energy of substances like radium, but as yet no practical means of getting large supplies of power from these sources have been devised.

The most hopeful source of energy is the heat of the sun. In sunny regions like Arizona it is easily possible to arrange mirrors so that the sun heats water and runs a steam engine. It is likewise possible to run an ether engine by allowing a reservoir of water, perhaps under glass, to be heated by the sun to a temperature of 100° F. more or less, and then used to vaporize ether, while cold water, perhaps from a mountain stream, is used to cool and thereby condense the ether. Or perhaps the method of capturing the power of the sun may be by allowing sunlight to produce some chemical change which takes place slowly, but can later be quickly reversed with the liberation in a few minutes of the power stored up during many days. None of these methods yet produces power as cheaply as it can be obtained from coal, but they hold out real promise for the future.

While it is impossible to foretell how the world will eventually get its supply of power, it is worth while for every progressive business man to consider the value of supporting the purely scientific investigations which will some day lead to such great practical results. Almost any investigation in physics, chemistry, or bio-chemistry, may furnish the clue which will one day give us a world where power is so abundant that it can be used freely everywhere. In such a world it will be possible to irrigate every desert no matter how dry, for sea water could be distilled if necessary, and pumped an indefinite distance. In such a world it might be possible to make almost indestructible roads by actually fusing the materials which bind the stones together, thus making a roadbed of practically solid stone. In such a world cities would be cleaner and more healthful than now because there would be far less dust and smoke, and because transportation would be cheapened and congestion relieved. And everywhere, including especially the warm unhealthful parts of the globe, people's health would be much improved because ventilation, sanitation, and travel would be so much easier than now. Moreover, many of the hardest kinds of work would be greatly reduced in amount, for everyone could use electrical machinery for purposes which are now possible only to the rich and for many purposes of which as yet men merely dream.

EXERCISES AND PROBLEMS

1. Compare the growth in the use of petroleum with the growth in population. From the table in this chapter plot a curve showing the per capita consumption of petroleum in the United States at the end of each decade from 1870 to 1920. Explain the sudden change in the direction of the curve. If present tendencies should con-

tinue what would be the approximate per capita consumption in 1950? About how many barrels would that mean per year? To answer this draw a curve showing the population of the U. S. from 1870 to 1920, continue the curve to 1950, and estimate the probable population. How does your result compare with the world's total production of petroleum in the last year for which statistics are available? Give reasons for thinking that the use of petroleum will or will not keep on increasing at the present rate.

2. Prepare three maps showing the distribution of developed sources of power: (*A*) a petroleum map from Table 25, (*B*) a coal map, Table 25, and (*C*) a waterpower map from Table 30 *C*. Use any type of symbols that you think most effective. Compare the three maps and classify the main countries into four groups according to whether they produce important amounts of three, two, one, or no sources of power. What kinds of countries fall in each group?

3. From the World Atlas of Commercial Geology, Part II, published by the United States Geological Survey, prepare a map similar to those of Exercise 2, but showing the *potential* waterpower of the different countries. Describe and explain the features of this map in comparison with your map of the waterpower already developed.

4. Study the sections of the World Atlas of Commercial Geology dealing with coal, or petroleum, and prepare a report and maps showing the relative distribution of production and of reserves. Table 25 in this book and a statement of coal reserves in the World Almanac may help you.

5. From Tables 26 and 27 in this book and from a table of potential and developed waterpower by states in Part II of the World Atlas of Commercial Geology, make a study of the power resources of your state. Examine the table in the World Atlas showing the proportion of the coal output used for various purposes. Determine the proportion of fuel used in different types of manufacturing as given in Table 17 in the section on manufacturing in the State Supplement of the Fourteenth Census (1919). Find out where the fuel used in your region comes from. Write a general report on the whole subject.

6. Compare the use of power in your own state and in some other of quite a different type, using the methods of Exercise 5.

7. Make a similar comparison, so far as possible, between your state and two foreign countries, one an advanced country and the other backward.

PART II

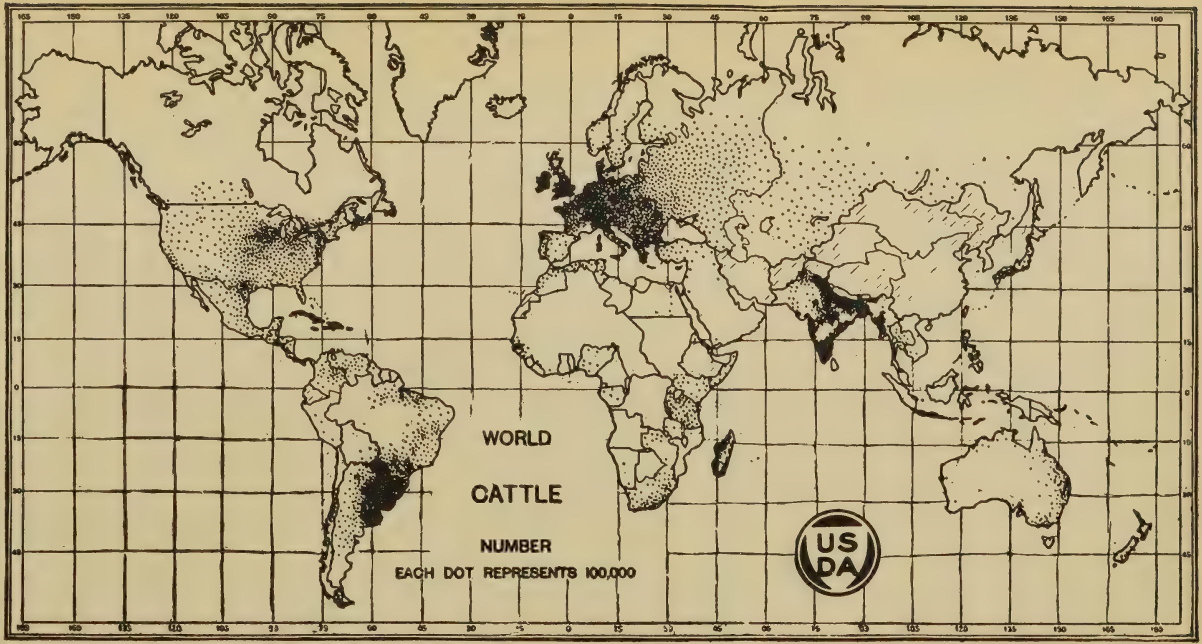
BUSINESS RELATIONS AS EVOLVED AMONG TYPICAL COMMUNITIES

CHAPTER X

COMMUNITIES DEPENDENT ON ANIMALS

The Types of Communities.—Man's habits and customs depend largely on the kind of products or work from which people derive a living. One community may depend on plants, another on animals, a third on minerals, and a fourth on manufacturing. A much smaller number depend on commerce, while others are mainly interested in government, education, religion, art, science, or recreation. Each of these communities lives in its own peculiar way. A great city may combine many types of communities, but the manufacturing section cannot possibly be like the section around the university, or like the part where the truck farmers live in the suburbs. Not only are the habits of the people different, but also their minds and characters. The army tests during the Great War showed that doctors stand high in powers of observation, while engineers excel in the faculties that involve mathematics and exact measurements. If the mind that turns naturally to medicine is different from the one that turns to engineering, there must be similar differences in the minds of diverse communities such as cattle raisers and merchants. The business man needs to understand the ways of thinking of the communities with which he deals quite as much as their habits and occupations.

In the present chapter we shall discuss communities that depend on animals. Here, as in later chapters, it will be impossible to discuss all the types that depend on a given means of livelihood, and we shall take up only the most important, or those that illustrate great principles. We shall begin with the most advanced.



Courtesy of U. S. Department of Agriculture.

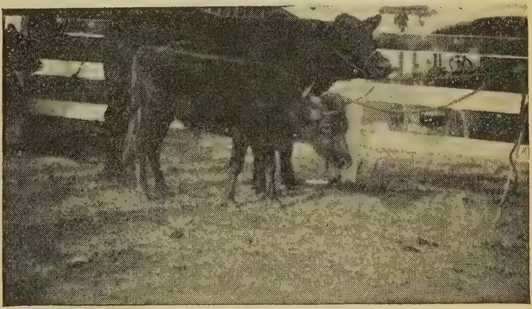
FIG. 38.—World Distribution of Cattle.

The centers of world cattle production are Europe, India, the United States, and southeastern South America, particularly the La Plata River Basin of Argentina, Uruguay, and southern Brazil. No figures are available for China and several areas in Africa. The large population of western Europe requires importation of beef in addition to the home supply. Most of these imports come from South America, North America producing now little more than enough for its own needs. India exports practically no beef.

The world production of cattle is 440,000,000 head, divided among the countries of the world as follows: India 34%, United States 16%, Russia 12%, Brazil 8%, Argentine 6%, Germany 4%, France 3%, United Kingdom 3%, Australia 2%, Canada 2%, Uruguay 2%, and other countries 8%.

A. The Dairying Community.—*Natural Conditions that Lead to Dairying.*—The use of animals dates back to the earliest known communities, for man was a hunter long before he cultivated the soil. Even today, although plants are far more important than animals as sources of food and raw materials, animals still furnish products for which there are no substitutes. Dairying, because it uses each animal for the greatest number of purposes, is in the long run the most profitable way in which a country can use its cattle. The distribution of dairying depends upon geographical conditions. Thus the density of population causes dairying to be more or less important near most large cities. Climatic conditions, however, have still more to do with the industry. Dairying tends to thrive where the summers, though sufficiently warm and rainy to produce abundant grass, are a little too cool for corn and too rainy for wheat. If such places have winters which are not too cold to prevent people from living healthfully and working comfortably, they are almost ideal for the production of a uniformly high quality of milk. If good transportation facilities can be developed, dairying is often the most profitable kind of farming for such a region. The climatic conditions which favor dairying are especially favorable to human health and to great activity, energy, and progress. Denmark, Wisconsin, New York, and New Zealand are excellent illustrations.

The Work of Dairying Communities.—In a dairy community some of the people are engaged in raising barley, corn, turnips, mangel wurzels and hay for fodder; others tend the dairy cows and breed stock of high quality. Some work in laboratories to raise the butter-fat standard and eliminate disease; while still others follow chemist's recipes in making cheese and butter, or employ the latest discoveries as to pasteurization and the preservation of vitamines in the preparation of condensed or dried milk. Some are busy repairing all sorts of dairying and harvesting machinery, or are working to market the product, to preserve it in storage warehouses, or to transport it by truck, rail, or boat.



Courtesy, U. S. Bureau of Animal Industry.

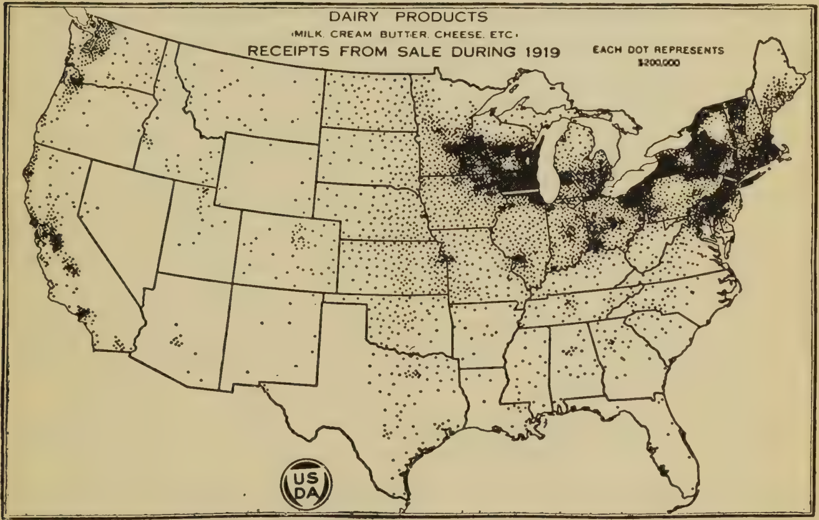
FIG. 39.—A Big One-year-old Pure-bred Angus Calf and a Three-year-old Piney Woods Steer

In addition to the direct work of dairying and of selling the main products, a dairy community engages in certain occupations arising out of by-products. The skimmed milk, together with corn in Wisconsin and barley and oil cake in Denmark, is used as food for fine bacon hogs. Some of the inhabitants in both Denmark and Wisconsin are engaged in another industry dependent on a by-product, namely, the disposal of the hides of the cattle that are killed for beef. The fact that Denmark makes many gloves, which are preferred above all others for heavy wear in Europe, is due in part to the dairying industry. In the same way the dairy farms near Milwaukee help that city to retain first rank in the tanning industry.

The Demands of Dairying Communities.—Since the dairy people sell their surplus at a good price, they can afford to satisfy their demands for many up-to-date articles which manufacturing communities wish to sell. For example, Wisconsin sends her food to the manufacturing cities and takes in return the textiles and shoes of New England and New York, and the automobiles and farm implements of Michigan, Indiana or Illinois. Denmark calls on the United States to supply her not only with dairy machinery but with wheat for the people and cottonseed cake for the cattle. She depends on Germany and Great Britain to furnish clothes, hardware and fuel.

Denmark: an Example of the Progressiveness of Dairying Communities.—Since typical dairying communities are located in regions where the people have a high degree of energy and ability, they are unusually progressive. Through the development of dairying as the industry best fitted to the climate and most competent to improve the sandy soil, Denmark produces so intensively that the Danish people are among the most prosperous in Europe. Though they number only three million, their yearly export of butter to the United Kingdom alone amounted to £4,000,000 in 1919. One reason for this is that the Danes have built up an uncommonly high reputation for sanitary dairy methods, and this is carefully upheld by the government. Tuberculosis, a disease dreaded by all cattlemen, not only for cows but because it may be passed on to people, is prevented by a monthly inspection of all cows. Another evidence of Danish thrift is the fact that nearly 90 per cent of the farms are worked by their owners.

The dairy industry, more than most kinds of farming, demands cooperation. This fact, together with Danish thrift, has led to some of the world's most remarkable cooperative societies. In 1895 a dozen dairymen with a joint stock of 300 cows formed an association and employed an expert cow tester. Today there are about 530 such associations for milk production alone. They have raised the standards so much that the butter fat produced per cow was doubled in 24 years. But the efficient sale of products and purchase of supplies is quite as important as scientific production. Hence, the cooperative societies concern themselves not only with breeding good animals, testing milk, making butter, and slaughtering hogs, but with marketing butter, milk, and cheese, and with buying fodder, fertilizer, tools, and blooded stock. One remarkable feature of Danish cooperation is that it is based on a great number of small independent farms. These are growing in number, as the law forbids the uniting of small farms, and favors the parceling out of landed estates. It is much harder to get many small owners to come together than to get a few large owners to cooperate, but such cooperation enables even the small farmer to have the advantage of modern machinery and expert knowledge.


DAIRY PRODUCTS
(MILK, CREAM, BUTTER, CHEESE, ETC.)
RECEIPTS FROM SALE DURING 1919
EACH DOT REPRESENTS $200,000
US DA

Courtesy of U. S. Department of Agriculture.

FIG. 40.—Receipts from Dairy Products in the United States, 1919.

The Dairy Industry in Wisconsin.—Wisconsin and New York are other regions where geographical conditions favor dairying. At present Wisconsin owns one-twelfth of the dairy cows of the United States; it has half the cheese factories of the country, and produced dairy products worth over $180,000,000 in 1919. The abundant production there and in northern New York arises partly from the fact that the climate, although too cool to make corn a main crop, is admirably suited to the growth of green corn for ensilage. Thus it is easily possible to fill the silos which are a necessity on American dairy farms because of the need of fresh fodder in winter. Like the Danish farmers, those of Wisconsin and New York greatly increase the fertility of the soil with the manure from their stock.

Another factor in the American dairy industry is cooperation. The cooperation which grew up in Denmark has spread to the dairy industry in other regions including Germany, Holland, Belgium, Switzerland, the United States, New Zealand, and even Siberia. In the United States Wisconsin in 1911 was among the first to pass a law providing for cooperative societies like those of Denmark. One reason for this is that one-fifth of the people of Wisconsin are European immigrants; and half of these are Scandinavians, Germans, or Swiss from lands where cooperative methods in dairying have met with success. For similar reasons the experiment stations of the State University perform unusually good service in teaching the dairymen how to build well lighted stables and keep them clean, thus diminishing tuberculosis. The stations have proved the value of highly bred animals so conclusively that the dairymen have not only eliminated most of the ordinary cattle but are now replacing their grade stock, as the half thoroughbred types are called, with real thoroughbreds. The change in the animals is typical of the way in which the dairying industry, where highly developed, is rapidly causing the work of converting grass into milk and milk into other food products to become one of the most advanced industries. Far more than any other animal industry it helps in the development of education and good government because it demands so much thought and study.

B. Cattle and Sheep Ranching.—*The Types of Herders.* (1) *Nomads.*—In spite of their importance commercially and in the advancement of civilization, the dairy farmers are only a small percentage of the people who depend upon domestic animals for a living. These other people may all be called herdsmen. They are divided into two main groups, nomads and ranchers. The nomadic herdsmen sometimes keep cattle, as in many grassy parts of the African plateau, or yaks as in Tibet; more often they depend mainly on sheep as among the Mongols and Khirghiz; others, such as the Arabs, rely largely upon camels; while some South American nomads depend on the llama. All the nomads are alike in having regular routes which they follow at special seasons. In the dry season they gather near the larger water supplies or in places where they can store a certain amount of hay; in the wet season they move far out into the desert; in winter in the cooler regions they come down to the lowlands; while in summer they seek the green pastures high among the mountains near the snow line. All have tents which can easily be folded up and packed on horses, camels, oxen, yaks, llamas or even sheep. Naturally, their furniture is of the simplest description, being chiefly bags, small boxes, rugs, and quilts, with a small number of utensils of wood, leather, and iron. Contrary to the usual supposition they live largely on milk, butter, and cheese, and do not eat much meat. They cannot afford it for their surplus animals and wool are the only products which they can exchange for flour, cotton cloth, knives, guns, and the few other manufactured goods that they require. On the whole they contribute very little to the world's business, for they usually tan their own leather, manufacture their own woolen clothing, make their own leather bags for milk and cheese, and carve their own tent poles and wooden bowls. Each family generally works for itself and buys little from its neighbors and little except flour from outsiders.

2. *Ranchers.*—The herders of the second type live in permanent homes which are frequently called ranches. This fosters a higher civilization than among the wandering nomads. Climate has much to do with determining whether herders shall be nomads or ranchers, but the stage of civilization has still more. In some places the climate is so dry that it is almost impossible for animals to find enough grass unless they are driven from one region to another, and there the nomadic habit persists, as in Central Asia, Arabia, and the Sahara. In most dry regions, however, civilized man is able to devise means of pumping water, raising and storing forage, and traveling quickly so that he can live permanently in one place and yet provide his cattle with food and water at all seasons. The fast disappearing cowboy stage where the cattle wander widely but do not regularly migrate from season to season is intermediate between the truly nomadic and the rancher types of herding.

Ranchers, in the sense in which we are here using the word, raise sheep or cattle for meat, wool and hides, but not for milk. On many a ranch with thousands of cows condensed milk is the only kind obtainable. Ranches are found in small numbers in New England where abandoned farms are being restored by keeping beef cattle on them; they are found in larger numbers in certain rugged unglaciated parts of southeastern Ohio where the land is so rough that it pays better to keep sheep than to practice real farming; and they are most numerous in the semi-arid or arid regions west of the prairies as far as California. Some are found in Hawaii, while they are also numerous in foreign countries, such as Australia with its hundred million sheep and Argentina, where we have the unusual condition of many sheep still persisting in the general regions where vast numbers of cattle are raised.

Ranching in the United States.—An examination of the western United States reveals the geographical conditions which influence cattle and sheep ranches. West of the corn belt, that is from the 100th meridian westward, the rainfall is so slight that dairying and all-around farming become precarious, and the production of beef cattle is an especially profitable industry. Cheap forage is there found in the broad grasslands; not far away to the east corn for quick fattening can be raised; while farther east beyond the slaughter houses in the corn belt lie cities of hungry people with well-filled pocketbooks. West of the cattle country, in the Rocky Mountains, lies the sheep country, more rugged and less fitted for farming than the cattle regions. It is not the optimum for sheep any more than the cattle region is the optimum for cattle, but each region is better adapted to its particular industry than to any other that has yet been developed.

The life on a cattle or sheep ranch is lonely. Only one man is needed to take care of a hundred cattle or a thousand sheep, whereas one is needed for every ten dairy cows. Since the rainfall is scarce each animal requires much more space than in a moister region. Hence, the ranches must be isolated. Much of the time the rancher must ride among his animals to see that they do not stray beyond the fences, that none are injured, that the young and the mothers are in good health, that the water supply is abundant and clean, and that the animals get enough food and do not eat plants that are poisonous. During the summer he must raise hay, alfalfa, corn or other forage if his land is moist enough or is irrigated. At other times, especially in the autumn, he must pick out the animals that are ready for fattening, and drive them to the railroad for shipment to farmers farther east who have corn with which to fatten them.

The business relations of cattle and sheep ranchers are far more simple than those of dairymen. The ranchers must, to be sure, buy practically all their food from producers farther east or on the west coast. In fact in proportion to their numbers they are among the greatest consumers of canned goods. As for manufactured goods they buy relatively few for, having little social life, they do not care much about dress; having relatively little cultivated land, they buy little machinery; and having a crop which moves to market on its own feet, they find automobiles less necessary than horses, which are kept at every ranch and ridden by everybody. The rancher's sales are even more simple than his purchases. Each ranch sells one or two main staples—live animals on the cattle ranch, and wool as well as live animals on the sheep ranch. The product is not sold daily as on a dairy farm, or at frequent intervals as on a truck farm, but only a few times a year.

One of the great handicaps of the ranchers is that their isolation and the infrequency of sales make cooperation difficult and tend to make the ranchers less wide awake, up-to-date, well educated, and progressive than dairymen. Nevertheless cooperation offers one of the most hopeful prospects of progress among cattle and sheep ranchers.

The Cattle Ranchers of Argentina.—Argentina furnishes a particularly interesting illustration of the ranching industry. There, as in the United States, great commercial cities on the Atlantic Coast, rich grassy plains farther west, then dry plains, and finally lofty mountains form a series of north and south belts or curved zones varying greatly in density of population, in occupations, and in the development of transportation. Hence, an agricultural zone around Buenos Aires merges into a cattle zone, which in turn gradually passes into a sheep zone that supplies mutton and wool. As in the United States, the gaucho or cowboy is rapidly disappearing. Formerly he sometimes made a living by catching wild cattle descended from those that had escaped from the early ranches in eastern Argentina, and selling the hides and tallow, leaving the carcasses to rot.

Today these wasteful methods have given place to well managed estancias, as the ranches are called. In these lies the chief difference between the cattle industry in Argentina and in the United States. The estancias represent an unprogressive system of landed aristocracy which gives little chance for an independent farmer to start on a small scale. Hence, society is divided into two distinct classes, land owners and tenants or peons. The land owner or "estanciero," uses part of his estate to support immense herds of beef cattle or sheep. The rest he turns over to "medieros" if he can secure them. The mediero is an immigrant farmer, usually Italian, who has enough money to buy his own seed and tools, but who cannot buy land. He goes halves with the proprietor on all the produce he raises, thus providing food for the estanciero's cattle men. If immigrants with some money are not available, the land is worked by poor newcomers, or "colonos." In such cases the proprietor takes more than half the produce. This discourages the colono whose crops are frequently poor because of drought. Hence, he often gives up in despair and moves on. This delays the conversion of the country into permanent farms and helps to keep it a cattle country. Nevertheless, the estancias are gradually being broken into small farms. The Argentine tendency to extravagance hastens this by causing the estancieros to run into debt, and laws are also beginning to be framed to help the small land owner.

The grazing lands of Argentina have risen in value so rapidly that the country has an unusually large number of very wealthy men, and the wealth per capita is greater than in any other South American country. At present the wealth of the estancieros aids the development of the Argentine cattle industry in two ways: (1) by improving the breeds of cattle, and (2) by making it possible to withstand the tremendous losses arising from drought and locusts. The annual show of high-bred stock at Buenos Aires is of national and even international importance. The estancieros are so eager to improve the rangy pampas stock by breeding efficient beef and wool producers that they pay astonishing prices for the prize-winners as sires for their herds. The best animals are usually English, for breeders in the United States do not send many animals, although the Argentinians are anxious to secure American stock. Only the wealthy ranchers can purchase at these shows. The losses from drought and from the visitations of clouds of locusts are often so severe that the small cattle owners experience great difficulty in making a living.

The rich pampas grass and the gentle topography adapted to railroads, need only European energy and capital to produce great wealth. The modern refrigerator ship makes it possible to export forty or fifty thousand quarters of beef in one load. Competition between native freezing establishments and those set up by packers from the United States has caused such rivalry that Argentine beef has an enviable reputation for cleanliness. In the future, communities of cattle ranchers may grow up in places like the grassy plains of Central Africa or northern South America, but for the present the geographical conditions of Argentina and Uruguay make them preeminently the countries of cattle communities. In the same way Australia will probably long continue to be the greatest region for communities of sheep herders.

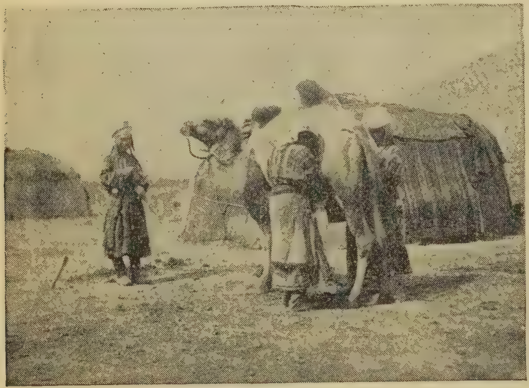


Fig. 41.—Khirgiz Nomads Milking a Camel.

An example of a nomadic animal community. The rug forming the door of the tent is a good example of primitive manufacturing.

C. Fishing Communities.—Let us turn from communities that depend on the animals of the land to those depending on the animals of the sea. Geographic environment is as important to such communities as to the others. Animal life is more abundant in cold water than in warm. Hence, the best fishing grounds are found where cold water covers shallow feeding grounds, as happens in high latitudes along drowned coasts and on the submerged plateaus known as "banks." When the lands bordering submerged, coasts are so stony, hilly and cold that farming is discouraged, as in Norway, Newfoundland, Labrador, and Alaska, the inhabitants have a double incentive to gather the harvest of the ocean.

The Newfoundland Fishermen.—Newfoundland is a good example of a fishing community, for 87 out of every hundred men are fishermen, while only 6 or 7 are mechanics, 4 farmers, and 2 miners. About 70 per cent of the island's exports are marine products, while of the eight chief exports all but two—wood pulp for paper and iron ore—are fisheries products. The cod alone furnishes about 88 per cent of the fish exported, so that it is not difficult to see why, to the Newfoundlander, the words "cod" and "fish" are practically synonymous. Like the Danish butter makers, and the Kansan cattle ranchers, the fishermen of Newfoundland are so occupied with one industry that they rely on other lands for their food, clothing, fuel, and implements. Consequently, flour, textiles, hardware, salt pork and fishing tackle are imported from the United States, Canada, and the United Kingdom.

Of the 37 million dollars' worth of fish exported from this cold barren coast in 1918, 60 per cent found a market in the warm countries of Portugal, Brazil, Spain, Italy, and Greece. This sale is accounted for in three ways: (1) dried fish is a convenient form of food in countries so warm that it is difficult to keep fresh meat; (2) many people in those countries are too poor to afford meat; and (3) the Catholic populations of Latin America and the Mediterranean countries abstain from meat on many days, but can eat fish.

Among fisherfolk there is little need for large cities. The population is scattered along the coast in villages at the heads of the larger bays. Since the fisherman's interests center on the sea, railroad transportation is not well developed. Although Newfoundland is crossed by one main railroad with branches running to the larger communities, it has only 700–800 miles of track, all government-owned, and many more people are reached by boat than by rail.

Constant exposure to the hardships and dangers of the sea has developed a people who are sturdy and courageous. Their independence is demonstrated by the fact that they form a separate province, having refused to join the Dominion of Canada. People who depend so entirely upon one resource are bound to meet with periods of want. Such periods are often demoralizing, for poverty causes people to diminish their expenditures on education and other uplifting agencies. When Newfoundland was impoverished by a series of scanty catches of fish from 1860 to 1868, the government made the mistake of giving out too much poor relief, which caused many people to be idle. Today, the government renders better service by encouraging industries other than fishing, and by maintaining hatcheries so that periods of dearth may occur less frequently.

The Fishing Communities of Japan.—The fishing population of Japan illustrates certain geographical principles which are not so apparent in Newfoundland. The Japanese fishing industry owes its importance partly to the summer climate which is too warm and wet to be healthy for either cattle or sheep. Domestic animals are rare and there has grown up a belief that ordinary meat ought not to be eaten, a belief now incorporated in the Buddhist religion. Nevertheless, the Japanese, like all other people, need protein in their diet. Beans and other legumes supply part of this, but thanks to Japan's long seacoast and many bays washed in part by cold currents, she can turn to the sea for fish.

The chief Japanese fishing community is located on Yezo, the northern island. Its people, like those of Newfoundland, catch cod, herring, and salmon. Unlike the Newfoundlanders they have little surplus for foreign export because they send the fish to the other islands of their own country. Nevertheless, the Japanese, being a clever, energetic people, develop a foreign trade in marine products without losing any of the valuable protein of their fish. This is accomplished by selling shell buttons, fish oil, isinglass, and iodine extracted from seaweed.

The Japanese fishing industry does not develop extensive or complicated business relations. The fishermen are poor and their small surplus enables them to demand from the outside world only a modest supply of cotton grown in Texas and manufactured in Japan, rice and soya beans from Chosen, and kerosene from the ubiquitous can of the Standard Oil Company. Nevertheless, the fishing industry plays an important part in Japanese life. For instance, the two fishing guilds have a membership of nearly 800,000, and largely through their influence the government has established hatcheries which recently liberated young fish at 29,000 different points. The sturdy Japanese fishermen are one of the reasons why Japan has been able to build up a great merchant marine and become one of the three chief naval powers.

D. Communities of Fur Hunters.—Fur hunters are not important from a business point of view, but they illustrate an interesting primitive type which has now almost passed away. Few communities have such intermittent relations with outsiders as do the fur hunters who are the chief inhabitants of the northern fifth of North America and of a similar area in Asia.

Though many of the hunter's simple needs can be satisfied only by the outside world, the Canadian trapper, for example, usually comes into direct business relations with other people only twice a year. First, in the spring he markets his product by opening his pack and counting his pelts before the agent of the Hudson Bay Company or Revillon Brothers; second, in the fall he supplies as many of his wants as his credit will allow, and loads his canoe with enough flour, pork, tea, and tobacco to eke out the supply of fish he has caught and dried during the summer. Also he replenishes his traps and ammunition, and his simple supply of clothes. True to the Indian type of mind, his capacities do not lie in the direction of business so that he is almost constantly in debt to the fur company. Such a debt is not displeasing to the agent since it means that the trapper must bring his furs to the same post the following spring.

Because furs are highly durable and of great value compared with their weight, the mode of transportation and the distance from the market have little effect on their cost. Almost the only means of transportation in the forest are the canoe, the dog sledge, and the Indian's own back. By such primitive means the trapper carries his skins hundreds of miles to the agent, reserving only a few to be made into winter clothing by the squaws. Then the skins are carried to the fur centers of New York, St. Louis, London, or Leipzig. Because the supply of furs is less than the demands of fashionable women of the far-away cities, the trapper always finds a ready sale for his mink, beaver, marten, otter and fox skins. Fur farms are as yet too much of an experiment to cut down the sale of wild pelts appreciably.

What slight contact the trapper has with the outside world in his business relations does him little good. His ignorance of the white man's ways is carefully encouraged by the fur companies, since many of the white man's habits lead to degeneration in the half breed, while " civilization " reduces the number of pelts that are brought in. Almost the only place where the trappers' contact with the white man results in any attempt to raise him is in the mission schools and churches. The life of his own hunting community does little to raise him in the way in which the dairyman is stimulated by his exacting occupation.

EXERCISES AND PROBLEMS

1. Find the relation between dairying and grain raising. On a map of the United States color the five states which lead in dairying (Table 20), the five which lead in corn, and the five in wheat (Table 16). Is there any overlap? How do you explain this overlap? Make a similar map of the dairy cattle per 10 inhabitants (Table 22) and the yield of corn and wheat per inhabitant (Table 18).

2. Find out the kind of countries in which cattle are important. From Table 14, Col. C, tabulate the ten countries having the greatest number of cattle. Place after each country its area and population from Table 1, Cols. A and B. Explain why these countries have so many cattle. Shade them all in the same color on an outline map.

From Table 15 C make another list showing the ten countries having most animals per square mile. Add the density of population from Table 1, Col. C. Explain the abundance of cattle. Shade these ten countries in another color on your map. Divide them into two main geographical types.

From Table 15, Col. C′ make a third list of the ten countries with the most animals per thousand people. Shade these countries in still a third color. What peculiarity do you notice in their geographical distribution? How much do the three shadings overlap? Where and why is the overlapping most pronounced?

Which of the three methods here used for measuring the importance of cattle to a country seems to you most significant? Why? Which method shows most clearly the location of a surplus? What bearing has this on business?

3. Use the method of Exercise 2 for a study of dairy cattle in the U. S. from Tables 20 C, 21 C, and 22 C; or of beef cattle from 20 D, 21 D, and 22 D. How far do the same states appear in the lists of the ten leading states based on all three tables? Define the beef and dairy cattle areas and describe the geographical character of the states where the surplus of dairy products or beef above local needs is greatest. What state appears among the first ten in all the cattle lists? Why? How does the total number of cattle per square mile and per inhabitant in the leading states compare with the number in the leading countries (Ex. 2)? Draw isopleth maps of the price of milk cows and other cattle (Table 23 C and 23 D) and determine the relation of the price to the number of animals, the density of population, and other factors.

On another set of maps shade the ten states having fewest beef or dairy cattle per square mile and per inhabitant. Explain the reasons for the relative scarcity of animals in these states.

4. Let various members of the class study other animals and also the production of eggs in the way that cattle are studied in Exercises 2 and 3. In discussing sheep try to explain the reasons for the two sheep-raising areas in the United States, and the differences between them. In considering the causes of the variation in the price of sheep make an isopleth map of the average weight of the fleece (Table 23 F) as well as of the price. What relation has this to climate?

5. Swine are said to be (1) widely distributed because of their ability to convert household waste into food, (2) useful as converters of skim-milk into a salable product, and (3) good converters of corn and barley into meat. How far do these three conditions account for the distribution of swine in the United States and in the world? Point out areas where swine are numerous for each of these reasons.

6. The distribution of horses is reported to show a direct relationship to the amount of land under cultivation. Show whether or not this is true by mapping the data from Table 10 A and Table 21 A. As mules are used extensively in some areas, include these (Table 21 B) with the horses in the United States. In studying mules draw a map to show the states that have more mules than horses.

CHAPTER XI

THE FARMERS OF THE TEMPERATE ZONE

Types of Communities Depending on Plants.—Far more than half the world's inhabitants get their living directly from plants. The lumbermen merely cut the trees that have grown without human care. The primitive tropical farmer sets out a few palm or banana trees, or drops some seeds of pumpkin, yam, or cassava into a hole punched with a stick, and leaves the plants to care for themselves with perhaps a single careless hoeing. His more advanced tropical and sub-tropical neighbors carry on an ancient and painstaking system of irrigation and transplantation in the culture of rice, or else under the guidance of people from cooler climates, cultivate plantations where a single crop, such as cacao, tea or sugar, is raised for distant markets. Outside the tropics many of the farmers likewise devote themselves almost exclusively to a single crop raised by the so-called "extensive" method of cultivating a large area somewhat carelessly with the aid of animals or machinery. Another large group are horticulturists or gardeners who raise a variety of vegetables, grains, or fruits, and who cultivate their land intensively without much use of animals. Finally the highest type of farmer cultivates a variety of crops somewhat intensively, and systematically makes the raising and use of animals a part of his farming. Thus we have at least seven types of communities that depend on plants, namely (1) lumbermen, (2) primitive tropical farmers, (3) tropical or sub-tropical rice farmers, (4) tropical planters, (5) one-crop farmers of non-tropical regions, (6) horticulturists or gardeners, and (7) all around farmers. Primitive tropical farmers, though extremely interesting, contribute so little to the world's business that they will not be discussed further. Of the other six types the three from non-tropical regions will be discussed in this chapter, while the two tropical types and lumberers will be left for later chapters.

The Nature of One-crop Agriculture.—The one-crop farmer, as the name suggests, relies largely on a single crop, even though he may plant more or less of several others. He generally cultivates this crop by extensive methods; that is, he scatters the seeds over an area too large to permit close attention to the growing crop. Thus the size of his crop is peculiarly dependent upon the weather, and its failure often ruins him. There are many examples of this type of farmer—the cotton farmers of the southeastern United States, the tobacco farmers of Kentucky and Virginia, the wheat farmers of the Dakotas, southern Russia, and Asia Minor, the rye farmers of central and northern Russia, and the currant farmers of Greece.

Such dependence on a single crop is often, although not always, due to one or both of two main reasons: (1) the crop is supposed to be the most profitable that can be grown in the region in question. This is the case with many of the American one-crop farmers. (2) The people are too inefficient to attempt a variety of crops because they are deficient in physical vigor, low in mentality, poor in education, or discouraged by social and political conditions. This is common in old countries like Turkey.

One-crop agriculture is subject to at least two great disadvantages. First, crop failures are particularly disastrous, for the farmer has no large second crop to fall back upon. Second, one-crop agriculture has a peculiarly bad effect on the fertility of the soil, for the crop takes away the same plant foods year after year. As few animals are kept, there is little manure to restore fertility; and periods of rest when the fields lie fallow add no new plant foods, although they allow the materials already in the soil to become still further weathered and prepared for the plants. Even if fertilizers are imported, the soil of one-crop farms cannot be kept as fertile as that of farms where a wiser system is practiced.

The Business System in One-crop Regions.—In regions where the geographical conditions help to cause one-crop farming to persist for a long time the whole fabric of business is affected. In the first place, the one-crop farmer, like the raisers of animals for meat and wool, makes relatively few demands upon the outside world. He buys, to be sure, a considerable portion of his food. For instance, the southern cotton grower may actually bring corn from Illinois and Iowa although his own climate and soil are adapted to that product. He also buys some implements, fertilizer, clothing and other manufactured goods, but being often poor because of the exhaustion of the soil and the repeated failure of his one crop, his demands are not large. Moreover, the sale of his one product requires only a few transactions each year. Hence, although the one-crop farmer with his cotton, wheat, barley, rye, or tobacco, as the climate and soil may dictate, unquestionably plays a great part in the world's production, he himself in many cases receives little stimulus and profit thereby.

In practically every country where the one-crop system has been long established two unfavorable practices—crop liens and tenancy—have become deeply rooted. This is true in the cotton raising South, in Turkey, Russia, India, Spain especially Andalusia, and elsewhere. The secret of it lies largely in the fact that where one crop is the main reliance, a single bad year throws the whole community into poverty. Often when seedtime arrives the farmers have no seed, no fertilizer, and no money. This provides a wonderful opportunity for the money-lender. Land is commonly cheap and not easily salable because it has been overcropped. Therefore the money lender prefers a lien on the prospective crop rather than a mortgage on the farmer's land. Time after time the crop is less than the farmer expects, and his debt remains largely unpaid, while ruinous rates of interest continue. Where the farmers are dull, inert, or happy-go-lucky as in many Asiatic regions, in Russia, and among the colored people of the United States, this means almost permanent indebtedness which is not far removed from peonage.

The system of liens leads to tenancy. Since the farmers are not stimulated and trained by business dealings or otherwise, they do not know how to protect themselves. Hence, many farms fall into the hands of the money-lenders, and the former owners become tenants who work the farms on shares. In parts of the southern United States many of the whites and four-fifths of the colored people are share-tenants. The system is extremely bad, for the tenant has no incentive to improve the land, and what does he care if the farm of a hard landlord deteriorates? The tenant's side of the bargain is seldom favorable, as may be judged from the following rhyme sung by the colored tenant who finds that when his cotton crop is baled and divided between the owner of the land and any others to whom he is indebted, it is a case of

> "Naught's a naught, and figger's a figger.
> All for the white man, and none for the nigger."

Fig. 42 showing the percentage of farms operated by owners gives an idea of the contrast between the North and South in respect to farm tenancy. Of course tenancy may be a step in the right direction if it means that a young man is temporarily a tenant while buying a farm, but when tenant farmers simply pay rent generation after generation, and even fall into debt because of the failure of their one crop, it is extremely harmful.

The One-crop Cotton Farming of the South.—Let us take cotton and wheat farmers as examples of the business conditions in communities of the one-crop type. In the southern United States tobacco was originally the most profitable crop, but the invention of the cotton gin, spinning jenny, and many other machines for cotton weaving, gave cotton an unrivaled lead more than a century ago. The general growth of manufacturing in England, New England and elsewhere produced an enormous demand for raw cotton, which only the South could supply. The long warm summers with their abundant rain furnished the right kind of climate. The Negroes supplied abundant and cheap labor for planting and especially for the prolonged work of harvesting; and highly intelligent white planters supplied the organizing ability for running big farms and for marketing the crop.

At first there was plenty of fresh land with fine rich soil, which yielded abundant and profitable crops even with wasteful slave labor. When the yield began to diminish seriously because of exhaustion of the soil, new land was broken on another part of the plantation, and the planters still prospered. Finally, however, the old fields had to be cultivated once more, but careless habits were so firmly established that the fields rarely received the requisite fertilizers or intensive cultivation with modern implements. When any cause lowered the price of cotton, the farmers at once felt the results of their mistaken policy. For example, during the Civil War when cotton was almost unsalable because it could neither be exported to Europe nor sold to the mills in the North, the cotton planters almost starved. Early in the Great War, when cotton dropped from 12.2 cents a pound in 1913 to only 6.6 in 1914, the condition of the cotton growers was so bad that everyone was urged to "buy a bale" and hold it in order to help the South. A little later, in 1920, the price soared to 37.7 cents a pound

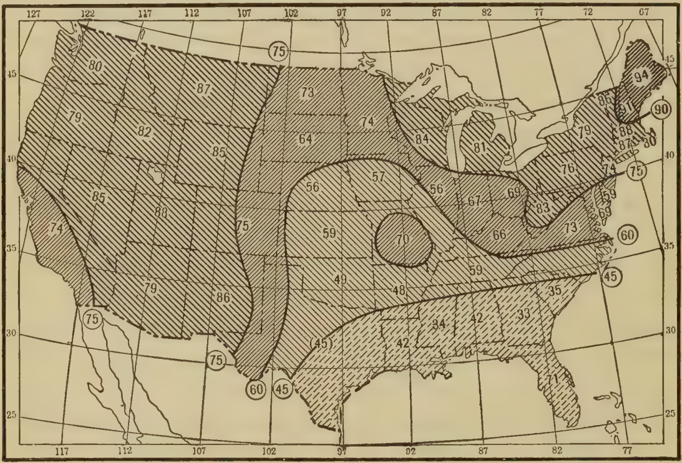
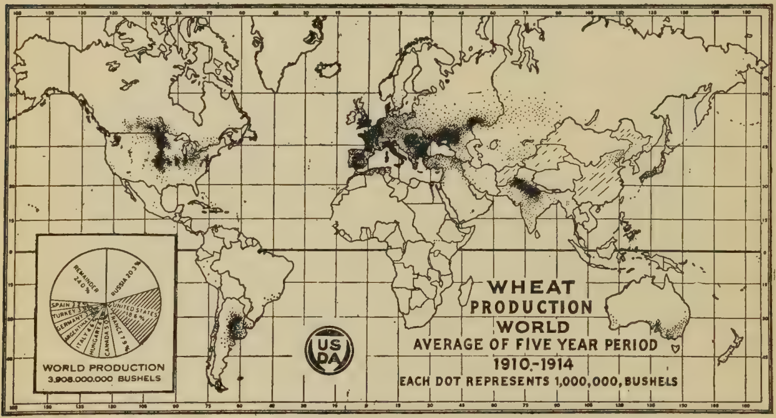


FIG. 42.—Percentage of Farms Worked by Owners in the United States, 1919.

and the Southern farmers prospered exceedingly. But after the war the price fell again to 11.5 cents in 1921, and there was renewed distress The net result is that during periods of economic disturbance the South, because of its one-crop agriculture, may suffer more than almost any other part of the country.

Elimination of the One-crop System in the South.—In the southern United States a vigorous campaign is being waged against the one-crop system. The boll weevil has been an ill wind that has blown some good, for it has helped to convince the Southerners of the evils of the one-crop system. Its ravages discouraged cotton raising so much that in desperation some planters have turned to raising cattle. Their profits have encouraged others to follow suit. Again the boys' corn and pig clubs initiated by the government have done much good, for the boys often set their fathers an example in improved methods. Equally important are the teachings of the industrial schools and experiment stations. At present most farmers buy their seed direct from the ginning factory, taking it as it comes, some good, some bad. The schools are teaching them to buy or raise selected seed which will yield cotton with fine, long, abundant staple, and seeds of large size with much oil. The item of oil alone is highly important, for today the cottonseed oil of the South is worth about $100,000,000 per year. Another lesson is that of cultivating the soil as well as the cotton. For example, a man who was born as a slave bought some wornout land which a white planter had "turned out." By the use of green manure and good tillage he obtained three and a half bales of cotton per acre whereas the average yield for the whole South is only about one-third of a bale, or one-tenth as much. With similar care everywhere the South could raise all the cotton that the world will take and also have abundant crops of many other kinds to preserve the fertility of the soil, give the farmers a more varied and stimulating occupation, and encourage them to use their ingenuity. The South, like all other places that are afflicted with the one-crop system and with the crop liens, tenancy, and discouragement which go with it, needs the system of government loans which is gradually being adopted, it needs better transportation and better systems of marketing the crops, but above all it needs to arouse itself so that each farmer will raise a well-planned variety of crops which will keep him busy at all seasons and stimulate him to do his best.

The One-crop Culture of Wheat.—Although vast quantities of wheat are raised by all-around farmers, as in France and Illinois, there are few crops in which the one-crop system is more widely prevalent. In the United States and Canada this type of agriculture is a temporary phase because the people are intelligent enough to see that though it is highly profitable on virgin land, it does not pay permanently. The same will also probably be the case in Australia and Argentina, where wheat is practically the only crop in vast areas. In more backward regions such as Algeria, southern Italy, southern Russia, northern India, and much of western Asia the one-crop, extensive system of wheat-raising has become almost permanent. This is partly because of scarcity of rain at some seasons, especially in summer, and also because of frequent droughts. These conditions prevent the growth of many crops and keep the people poor. Moreover, many of the one-crop farmers lack energy and initiative.



Courtesy of U. S. Department of Agriculture.

FIG. 43.—The World's Production of Wheat.

In the United States, Canada, and Argentina the one-crop system of wheat raising has been steadily pushed westward. Formerly the knowledge that there was plenty of new land made the American wheat farmer careless of how he exhausted the soil, just as the Russian farmer was made careless by the knowledge that owing to his communal system of holding lands the tract that he cultivated might next year be assigned to someone else and he would reap no benefit from improvements. So the frontier wheat farmer scattered the seed over scores of acres and left it to the care of nature—the most extensive of all kinds of farming. Even now this system still persists somewhat in the Dakotas, Washington, and Alberta. But wheat exhausts the soil about twice as rapidly as cotton, and the growth of population makes the land more valuable for other types of farming. Hence, the one-crop wheat system rarely endures permanently among progressive people.

The one-crop frontier wheat farming of the United States and Canada has occasioned some unique developments in machinery. Such huge farms with a single short period of sowing and again of harvesting are confronted by a very serious labor problem, especially as they are located in regions of sparse settlement. At harvest time the farmers must depend largely on itinerant labor attracted from regions farther east by high wages. Men temporarily out of work in the villages and cities, college students, and sons of the corn-belt farmers who have completed the summer work on their own farms travel to the wheat fields when the grain is ripe. Nevertheless, there is often a serious shortage of labor, and the wheat farmer is rarely sure of getting all the men he needs. This has led to the invention of improved machinery such as gang plows, huge reapers, and twine binders. Thus the amount of human labor needed in raising one bushel of wheat has been reduced from three hours in 1830 to ten minutes today. In spite of this, the need for labor is still great, as may be judged from the fact that in 1921, when many men were idle in the East, the Western farmers of the United States and Canada were clamoring for help. The United States Department of Labor carried fifty or sixty thousand men to the grain fields but they were not nearly enough.

Today one-fifth of the wheat in the United States is raised on small farms of less than one hundred acres. On such farms the great machines are too expensive unless the farmers learn the lesson of the dairymen and cooperate in owning them. As the big one-crop farms give place to all-around, diversified farming, commercial fertilizers are introduced, crops are rotated, leguminous crops like clover are planted every few years and plowed under to provide nitrogen, and the number of stalks to each plant is increased by tillering or partly covering the young plants with soil. The government cooperates with the farmers in fighting the Hessian fly, and in finding varieties of wheat adapted to all sorts of climate and soil as the Durum variety is adapted to semi-arid regions. In all these ways the wheat farmer is changing his methods so that not only is the yield of wheat per acre increasing, but wheat becomes merely the cash crop, while the farmer's food supply comes from other crops.

In backward countries where the one-crop system has become firmly established, it leads to many difficulties and much hardship. For instance, in southern Russia many famines, including those of 1891, 1898, and 1921, have been due to deficient rains at critical periods and consequent failure of the wheat crop. If other crops could be raised, whose critical periods came at different times, the chances of famine would be much diminished and the prosperity and civilization of the affected regions would be raised. Unfortunately for such countries as Algeria, Turkey, and northern India the rains come only at limited seasons, a fact which makes it hard to find many crops that will thrive and thus tends greatly to establish the one-crop system of agriculture.

The Horticultural Community.—*The Use of Vegetables and Fruit.*—The use of fruit and especially vegetables is steadily growing for two great reasons, economic and physiologic. The economic reason applies especially to countries like China and Japan where the population is so dense that it is necessary to utilize the land to the fullest extent, but it also applies to the growing population of the manufacturing regions of the United States and Europe. As the population becomes denser and as the proportion who dwell in cities increases, the prices of grain and meat rise rapidly. The acreage actually farmed becomes too small to support the entire population unless more intensive methods are employed. Vegetables are especially adapted to intensive cultivation because they yield a large amount of food per acre and grow so rapidly that two crops can often be raised in one season. Improvements in methods of canning, preserving, and drying, and better facilities for transportation and cold storage also help by making it possible to utilize vegetables more widely and at all seasons.

The physiologic reason for using fruits and vegetables depends on the recent discovery that they contain substances called vitamines which are essential to health. The economic demand of poor people for vegetables because they are cheap and the physiologic demand of intelligent people for both fruits and vegetables at all seasons because they are healthful has greatly stimulated the growth of communities whose business is to furnish fruit and garden produce to city markets. Such farming is called market gardening when carried on close to the cities, and truck farming when carried on farther away and hence less intensively. Market gardeners, truck farmers, and fruit growers, as well as the people who raise flowers, are known as horticulturists.

From year to year the people of the cities not only buy greater amounts of fruits and vegetables but are more discriminating in their purchases. They demand high quality and freshness throughout the year. Some pay fancy prices for fruits that are out of season. It is not unusual to see strawberries in February at fifty cents or a dollar a box, while peaches at that season are sometimes as high as seventy-five cents apiece. Fruit sold at such prices is generally grown under glass by specialists in horticulture and furnishes only a small percentage of the total consumption. The demands upon which the market gardeners, truck farmers, and fruit growers mainly depend are illustrated by the almost daily purchases of lettuce, cabbages, onions, apples, and oranges by thousands of families of moderate income.

The Geographic and Economic Control of Horticulture.—Before the development of modern transportation each region was content to eat those fruits and vegetables which the climate permitted. In the more progressive regions a few people had greenhouses and many gardeners used cold frames to start their early vegetables. Today this is greatly changed, for transportation allows keen competition between widely separated areas. For example, in supplying the northern cities with the lettuce and spinach which now appear on many tables almost daily even in winter, truck farms all the way from Florida northward compete with local market gardeners who raise their product under glass. Such competition leads the gardeners to specialize in what are called " cash crops " especially adapted to their particular regions. The crops which are specialties in a given community are determined largely by the following considerations.

(1) Other things being equal, the producer near the market has a great advantage, not only because of lower freight and express charges, but because his product is relatively fresh and his losses from decay and waste are relatively slight. Half of many a shipment to New York from the South is thrown away. (2) Soil is also a factor of some importance. A sandy loam is favorable because it warms quickly and facilitates early crops, and is also easily, cleanly, and cheaply worked. (3) The most important factor is climate, which determines not only the season at which crops can be raised but how many crops per year. The South Atlantic States and California have the advantage of a long growing season. They often harvest two crops for sale and raise a third for fertilizer. On the other hand, the warmer states, especially in the East, have more trouble than the cooler states with insect pests, their soil is more leached by the rain so that more fertilizers are needed, and their labor supply, being largely colored, is less energetic and intelligent.

The progressive truck farmer wishes his locality to possess three other advantages: namely, plenty of clear water for irrigation or for preparing vegetables for market, a good air drainage so that cold damp air will not settle over the crops in spring, and good roads so that trucks may quickly reach the shipping points. Horticulture also requires a dense population because it demands a great deal of cheap seasonal labor. The plowing and planting, the cultivating by horse or machine, and the heavier harvesting as well as the work of taking the vegetables to market or peddling them from house to house generally require men, but the careful hand weeding, the picking of small fruits, peas, beans, and so forth, and many other little jobs need the work of hundreds of women, girls, and children. The supply of labor must be not only cheap but of a sort which may be recruited quickly for the short harvesting season. When fruits and vegetables are ripe, they must be picked immediately. In fact, some peach growers consider that there is exactly one day on which that fruit should be picked. It is almost impossible to find cheap labor which is willing to work for a short time unless there are industries nearby which employ the men of the families, but not the women and children. For that reason the market gardeners, who form a ring around practically all great cities, are able to engage in much more intensive cultivation than are the truck farmers who are farther from the labor supply. It must be remembered that intensive cultivation, like that which is so dominant in China and Japan, requires an immense amount of hand labor, but yields a large return from a small area; extensive cultivation, on the contrary, employs a relatively small amount of human labor for it relies on horses or machines; it raises much per individual, but not so much as the intensive method per acre. The intensive method is essential when the population is dense but it always means that somewhere in the vicinity there is a considerable body of relatively poor people who furnish a cheap labor supply. The extensive method implies a much higher general level of comfort although it does not usually imply the existence of the small group of rich people who are generally the accompaniment of the poor people with their cheap labor.

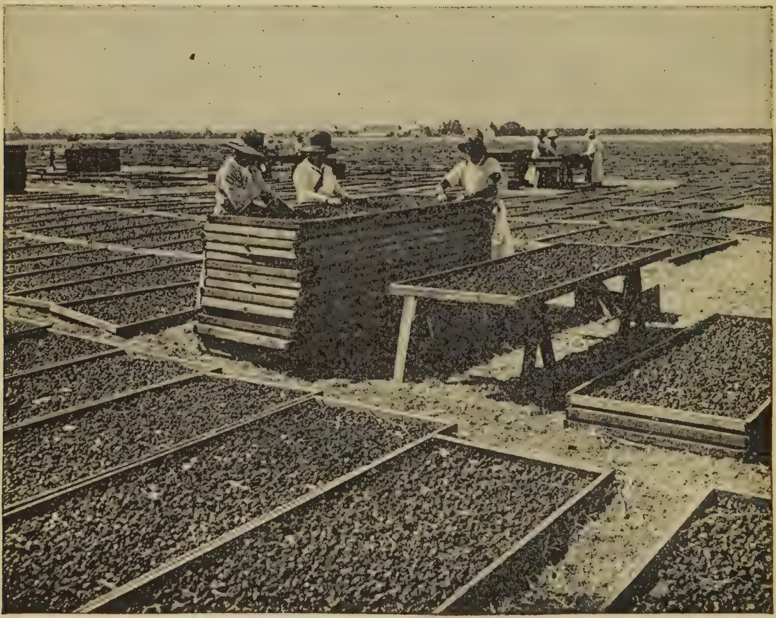
Relation of Horticulture to Character.—Gardeners are often supposed to be a rather shrewd, intelligent, reliable set of men. This may be due partly to the fact that for all concerned the work in a horticultural community is usually beneficial. For the men, women, and children the outdoor work is wholesome, pleasant, and not too hard. The life is socially agreeable, for the farms are small, and the houses are consequently near enough so that there is not the isolation which is the bane of some other farming communities.

The outstanding traits of the Chinese seem to have a close connection with the horticultural type of farming. The work in the little Chinese gardens furnishes an excellent training in patience, in the capacity to plan for the proper rotation and succession of crops, and in economy and thrift, for every bit of fertilizer and every square foot of land must be utilized. The splendid capacity of the Chinese for extreme care, accuracy, patience, and economy are partly the product of the intensive system of horticulture. This has been fostered not only by the density of the population, but by the abundant rain during the warm summer and by the dry spring season when many crops can be started only in beds that are artificially watered. Not only does the teaching of the elders pass on such traits to the children, but in the famines which frequently afflict that country the children of careless parents are much more likely to die than those of the parents who are careful and economical.

In our own country the work of the market gardener and truck farmer demands a great deal of careful planning as to what crops are best fitted to the soil, what ones will pay best in competition with those from other regions, what times of planting will give the largest return and find the best market, what kinds of fertilizer and of rotation of crops will bring the best returns and at the same time retain or improve the productivity of the soil, and what plans can be made to insure a plentiful labor supply at the right times and keep the demand for work as steady as possible. One great value of horticulture lies in the fact that the units are usually small so that each farmer must to a greater or less degree think out his own problems. Though no great skill is required, garden work demands more judgment than most factory work, and it is more interesting to decide which beans are ready for picking than to shove a bit of metal into a machine hour after hour in a factory. It is vastly better not only for an Italian peasant woman and her children, but for the children of any thrifty family to go out to a market garden or truck farm and work during the summer rather than run on the streets or work in a factory or store. It means not only earnings for women and children, and hence better business for everybody, but also better character. Few other occupations, except diversified, all-around farming, are better calculated to build up a sturdy, self-reliant middle class who furnish the background for almost every other sort of business.

Cooperation among Horticulturists.—The fact that horticulturists generally live in fairly compact communities and are not widely scattered like many farmers makes cooperation relatively easy. In irrigated regions this is peculiarly the case, for the whole community depends on a common water supply, and each man's rights must be carefully guarded so that he may get neither too much nor too little water. Among the market gardeners and truck farmers, however, there is much less cooperation than among dairymen, but more than among wheat and cotton farmers. The fruit growers have made most progress in this respect. For instance in California one cooperative society has 8000 members. Such societies arose largely because of the difficulty of shipping fruit long distances without great loss.

The fruit raisers required low railroad rates, refrigerator cars, and fruit expresses. Their fruit needed to be cooled before shipping; their common enemy, the many fruit pests, had to be fought. So today the Western fruit growers associations are well-managed business enterprises directed by experts who conduct advertising campaigns, protect their brands of fruit by copyright, enforce careful grading and packing, care for the pre-cooling of the fruit and the icing of the cars en route, negotiate for lower freight rates, keep in telegraphic communication with the Eastern markets so as to hold back or change the destination of shipments, and purchase tools and other supplies for their members at wholesale prices.



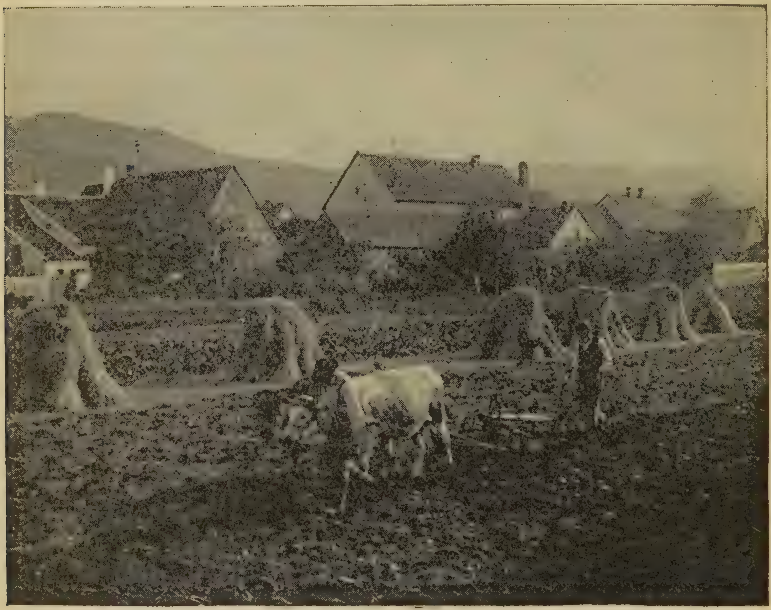
Courtesy, California Prune and Apricot Association.

FIG. 44.—Sorting California Prunes for Quality.

Possibilities of Horticulture.—The possibilities of horticulture are enormous, and the people of the United States have much to learn in this respect from China. In the United States most of the land has been cultivated less than 100 years, and many soils are already exhausted. The annual bill for commercial fertilizers amounts to 300 million dollars. In China the soil has been cultivated 30 or 40 times as long and is still highly fruitful, for the farmers have preserved the fertility of the soil even without importing fertilizers. In the United States the number of improved acres per person is about 5; in China less than 2. Here is an actual example of what a farmer in China can do by means of intensive horticulture. On an acre and two-thirds he supported ten people, one donkey and one pig. At the same rate one square mile of land would support 3840 people, 384 donkeys, and 384 pigs. This represents a standard of living far lower than is desirable, but it illustrates how great are the unused possibilities of the land. The most desirable thing is that each acre of land should yield the largest possible return in proportion to the work and capital put into it. In China too much work goes into each acre; in America the opposite is the case. Apparently the line of progress for the horticulturists of America is that even if the farms continue to be so small that the farmer and his family can do most of the work in an emergency, cooperation should prevail far more than is now the case. The horticulturists have much to learn from the dairymen in this respect.

Diversified All-around Farming.—*The Well-rounded Work of Diversified Farming.*—The highest type of agriculture is a combination of all the other types. If farming is to be as scientific an industry as engineering for example, which it surely must be in the future, the farmer must solve some very complex problems. He must determine what types of crops will be most profitable on the basis of (1) the climate, soil, and topography; (2) transportation facilities and distance to market; (3) type of produce most in demand; (4) relation of his business to that of his neighbors; (5) cost of his land, his supply of capital, and the cost of labor; (6) prevalence of harmful insects and other pests; and (7) the customs of the community. Where so many factors are involved it is clear that some will be favorable to one crop and some to another; and also that some may vary considerably from year to year. Hence, the farmer's best solution of his problem is to distribute his capital so as to take advantage of the greatest number of desirable combinations. Thus he becomes an all-around farmer interested in grain-raising, truck-farming, dairying and meat raising. In this way he uses his labor supply economically since he chooses crops which can be planted and cared for at different periods during the growing season. By raising animals, especially dairy cows and poultry, he provides as much work as possible through the winter so that he can keep part of his farm hands through the year and can also have a cash income every month. Furthermore by keeping animals he retains the fertility of his farm, for he restores to the soil most of what is taken out. Moreover, he saves much waste by feeding the animals the stubble, garbage, skimmed milk, and the fruit and vegetables which begin to rot even on the best-managed farms.

As one rides through a region of such farms in Ohio, Illinois, or Iowa, for example, he sees that the best of them have substantial, comfortable, well cared for farm houses. Each house is flanked not only by a large barn for cattle, horses, and hay, but by a silo, some poultry houses, a hog barn, and several smaller buildings such as a tool house, garage, and woodshed. On one side of the buildings a good-sized orchard produces chiefly apples, but also other fruits. On another side there is a vegetable garden, while probably a pretty flower garden adorns the front. Not far away a paddock of perhaps an acre or two provides a place where the animals can be turned out. Farther away there are large fields of corn, wheat, barley, hay, and alfalfa, and smaller fields of potatoes, cabbages, sugar beets and so forth. Some land is devoted to pasturage and perhaps to a woodlot. No one farm is likely to raise more than about half a dozen crops at any one time, and the exact combination varies from farm to farm and region to region. The point, however, is that the crops include grain, vegetables, fodder, and fruit.



Keystone View Company.

FIG. 45.—All-around Farming near Saarbruck, Germany.

Geographical Limitation of Diversified Farming.—Such all-around farms are limited to a relatively small part of the earth's surface. They are found in large numbers only in the northern, and especially the north central part of the United States, where part of Illinois is an example, in southern Canada, in New Zealand and a small part of southeastern Australia, and in northwestern Europe where northern France is an excellent example. Elsewhere an occasional farmer has such a farm, but they are the exception. The reason why this highest type of farming is much less widespread than either the one-crop type or horticulture is that its requirements are much more exacting. In the first place it requires a fair supply of rain at all seasons or else irrigation. Otherwise the crops that can be grown are limited in variety, and dairy cattle are hard to keep in good condition. Second, it demands a fairly good development of transportation, for otherwise the farmer cannot market his milk, butter, and eggs, and his crops that need to be used soon after gathering. Again, diversified farming requires a greater knowledge than almost any other kind of farming, for the farmer must not only have a knowledge of crops and soils, but of animals. Moreover, it requires more energy and greater mental activity than most kinds of farming, for the successful all-around farmer must always be on the alert, and must be a good business man as well as an agriculturist.

Just so far as the farmer lacks these qualities he tends to degenerate toward the one-crop type. In fact many men who would say that they are practicing diversified farming are in reality only in a transition stage between that and the one-crop variety. Today many market gardeners, fruit farmers, and dairymen are more highly trained and competent than the ordinary all-around farmer. They are often specialists while he is a general worker. This, however, does not necessarily mean that the specialized type of farming is the best. It probably means that large combinations are needed in farming as in many other occupations. The ideal farm should perhaps have a section devoted to dairying in charge of one specialist, a section devoted to truck farming in charge of another, and similar sections devoted to fruit, poultry, grain, or other products. The main point is that the most successful farming requires (1) that the fertility of the soil be preserved by raising animals and by every other possible means, and (2) that the risks be distributed so that there will be no danger of disaster because of the failure of one or two crops. Such farming requires specialists. It also requires that the men who run the different parts of the farm have a direct personal interest in its success. Therefore it requires specialization and cooperation as well as conservation and diversification.

EXERCISES AND PROBLEMS

1. Choose a foreign country or region where one of the main types of the agriculture of the temperate zone is well developed. Look this up in the encyclopedia and other reference books, and write an account of its agriculture along the lines indicated in this chapter.

2. Study the agriculture of regions of the United States where one crop predominates over all others. The Abstract of the Census contains a table (p. 368 in the Abstract for 1910) showing the per cent of the total value of crops represented by various individual crops. Make a list of all states where at least 40 per cent of the total value of all crops belongs to any one crop, beginning with corn. Group these states according to the main crop. On an outline map shade in separate colors the states where each of three main crops tends to be the chief reliance of the farmers. Explain the reasons for the distribution of these states. For each of the three groups tabulate the figures from the following tables: 10 D, I, K, and M; 22 A, D, E, G, and H. Draw conclusions as to prosperity, tenancy, race of farmers, and abundance of animals where each of the three crops predominates. It may help if you obtain averages for each group, or if you use a few typical farming states, namely Iowa and Nebraska as corn states; Mississippi and Arkansas as cotton states, and Wyoming and Nevada as hay states. What difference does the number of animals make in determining whether a state really practices one-crop farming in a harmful form? Describe the corn, cotton, and hay types of agriculture in relation to the types described in the text of this chapter and the last.

3. The table in the Abstract of the Census referred to in Exercise 2 suggests that Pennsylvania probably comes as near as any state to having an ideal combination of crops. See if you can determine why. What other states have nearly as good a combination? In what respects are the following states less favored or more favored than Pennsylvania: Massachusetts, Illinois, South Dakota, North Carolina, Alabama, Oklahoma, Utah, Oregon, your own state?

4. Compare the use of the arable land (Table 9) in regions with the following climates: (*A*) cyclonic temperate with rain at all seasons (use Austria, Canada, France, Germany, Great Britain, New Zealand, and United States, (*B*) Mediterranean, with winter rain and summer drought (use Algeria, Australia, Chile, Italy, South Africa, Spain, and Tunis), and (*C*) tropical (use Costa Rica, Cuba, Dutch East Indies, Formosa, French Indo-China, India, and Porto Rico). Make a table showing the average for the countries of each climatic group according to Cols. H, I, J, and K, Table 9. Discuss the nature and causes of the differences in the averages. In which group does the apportionment of the arable land come nearest to the following: cereals, 50 per cent; hay and forage, 20; food plants and vegetables, 15; industrial plants such as cotton, flax, and hops, 10 (the remaining 5 per cent fallow land used as pasture)? Explain why this apportionment of the land is favorable or unfavorable. Pick out countries where the apportionment is nearly as above. How do they rank in progressiveness?

5. Where is tree culture of relatively greatest importance? Why is it an advantage for a country to have at least 5 or 10 per cent of its productive land devoted to tree culture aside from its forests? What countries in Table 9 E approach this condition most closely? Explain why the following countries have less than 10 per cent in 9 E, and what harm it does them, if any: Belgium, Denmark, France, Germany, Hungary, Norway, Russia, Serbia, United States. Compare these with tropical and Oriental countries.

CHAPTER XII

THE CONDITIONS OF BUSINESS IN TROPICAL COUNTRIES

Conditions that Control Tropical Agriculture.—In tropical countries the products of agriculture are overwhelmingly the main contribution to the world's business, although lumber, as we have seen, may soon be a large article of export. Other forest products still have some importance, but wild rubber, ivory, cabinet woods, medicinal barks, gums, etc., play a very small part compared with the sugar, coffee, tea, rubber, cacao, quinine, and fruit raised on plantations. Tropical agriculture, as we have seen, falls into three main types: (*a*) primitive hoe culture, which contributes almost nothing to the general business of the world; (*b*) rice culture, which resembles the one-crop agriculture of cooler regions but has far less effect on business, and (*c*) plantation culture, which is of great and growing importance. Before discussing the last two types, let us consider the general geographical factors which control agriculture and business within the tropics, and especially the relation of the white man to warm climates.

(1) *Rapid Growth of Vegetation.*—One of the most notable features of tropical countries is the luxuriance of vegetation. For instance, in order to visit some of the wonderful Maya ruins a traveler wanted to traverse certain roads shown on the best maps of Yucatan. "But there are no roads," said the guide. "They are on the map, but that was five or ten years ago when the chicle gatherers were bringing out gum. No one can find them now. They have all grown up to forest."

In such regions ordinary bushes grow six feet a year, while types like the banana shoot up fifteen or twenty feet. In the clearings the weeds seem almost to spring full grown from the ground. Certain grasses make a dense mat that chokes out everything else and can be rooted out only at an almost prohibitive expense. Many tropical farmers have to clear new lands each year because of the grass and weeds. For example, in the Philippines about 48,000 square miles, or 40 per cent of the whole area, are covered with tough cogon grass 5 or 6 feet in height and with the tahalib grass of the moister parts which reaches a height of 9 or 10 feet. Such rapid growth has certain advantages as well as disadvantages. Sugar canes 6 feet long are fit for cutting in a year after planting; huge bunches of bananas are ripe, not much more than a year after the buds sprout from the root; rice yields ten to a hundred bushels per acre compared with ten to thirty for wheat in the temperate zone; and two or three crops of millet can be grown each year.

(2) *Low Food Value of Tropical Products.*—The rapid growth of tropical products tends to give them a low food value. Rice, which is far the best of the common tropical foods, is less nutritious than any of the other important cereals except rye and millet, but millet is also largley a tropical product rivaling rice in importance. Although rice supplies nearly as many calories of energy per pound as wheat, it contains about 2.5 times as much starch as there ought to be in an ideal food in order to balance the proteid or muscle-building material, while in corn the proportion is only 2.1, in wheat 1.4, and in oats 1.1, or almost exactly right. The banana fills people's stomachs but does not supply strength. It would take about 10 pounds of bananas per day to yield the energy or heat needed by a man at hard labor, and 50 pounds to yield the necessary proteid. The vegetables are coarse, stringy, and watery. The sweet potato, for example, contains proportionally only half as much protein as the common white potato, and the yam and cassava are still more starchy. Likewise, although some cultivated forage plants such as Para and Guinea grass and Sudan gram make good fodder, most of the plants eaten by animals though often large and succulent are relatively lacking in nutrition.

(3) *Rapid Exhaustion of the Soil.*—We have already seen that the abundant rain and high temperature of tropical regions allow the soil to be rapidly weathered and rapidly leached. This intensifies the effect of the climate in causing tropical food products to be poor not only in nitrogenous proteids, but in potash and phosphates. A minor result of the rapid leaching of the soil is that in the moister regions it probably intensifies the effect of weeds and grasses in preventing the primitive tropical people from raising more than one or two crops from a field without allowing it to rest several years. Thus in Yucatan among the Maya Indians and in northern Burma and Siam among the Shans, it is common to cultivate a field one or two years, then make a new clearing, burn the brush, and start a new field. Such practices prevent the accumulation of capital in the form of improvements on the land and permanent houses.

(4) *Scanty Supply and Poor Quality of Animals.*—Most people think of tropical regions as the home of many animals. There live the dangerous carnivora such as the lion and tiger, and a host of herbivora such as the elephant, hippopotamus, gnu, and many antelopes. Nevertheless, domestic animals are scarce and of poor quality. The reason

is that in tropical climates the more valuable domestic animals—the cow, sheep, and horse—are forced to live under conditions quite different from their optima, so that they cannot easily resist disease. Moreover, the frequent scarcity of food, forage, and the presence of innumerable insect pests like the tick and tsetse fly weaken them. Hence, the domestic animals are often too small and weak to be of great use as draught animals, and are too few in number to furnish the proteid needed by people whose diet is otherwise so starchy.

(5) *Lack of Seasonal Stimulus.*—Man's own qualities, quite as much as those of the plants and animals, tend to retard tropical agriculture and civilization. In the earlier stages of human evolution few stimuli are more potent than a long dry or cold season. Suppose that two groups of primitive people were alike, but one was placed in a mild, well-watered tropical region and the other in a region with a fairly severe winter. In the tropical region where food can be procured easily at all times, where clothing is not essential, and where anyone can make a simple shelter from the rain, the stupid and inactive people would have little trouble, but in the more severe climate they would be killed off because they would not have sense and energy enough to provide for the long winter. Such climatic selection helps to explain why tropical people have a racial inheritance which makes them less energetic, efficient, and inventive than the races of more bracing climates.

(6) *Health Within the Tropics.*—(*a*) *Poor Diet.*—Tropical races are physically and mentally handicapped by poor health as well as by inheritance. This arises in four important ways, whose relative importance is estimated quite differently by different authorities: (*a*) from poor diet; (*b*) from the departure of the climate from the human optima; (*c*) from the ravages of disease due largely to insect pests and bacteria, and (*d*) from ignorance, superstition, and unhygienic and unsanitary practices. The coarse, bulky, starchy, diet causes many digestive disorders and other diseases. Beans and various kinds of pulse are indeed raised to supply the lack of proteid, but not in sufficient quantities. Many tropical people have such a craving for meat that when they wish to honor a stranger they give him so much meat that he craves vegetables and fruit. Another cause of ill health is the monotony of the tropical

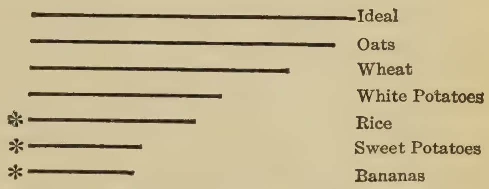


FIG. 46.—Relative Amounts of Proteids Compared with Fats and Carbohydrates in a Given Dry Weight of Tropical or Subtropical Foods Versus Those of Cooler Regions. (*) Tropical or Subtropical.

diet. If people have rice, they often eat rice and almost nothing else; if they have millet or cassava, they eat millet or cassava.

(*b*) *Departure from Climatic Optima.*—A similar weakening of tropical people is due directly to the climate. The optima for different races appear to vary far less than do the climates in which men actually dwell. For example, the best temperature for Sicilians and Finns is apparently almost identical, and the best for Negroes in the United States appears to be 68° F., or only 4° F., higher than for whites. This seems to mean that practically all tropical people live permanently in a temperature higher than their optimum. This is much worse than living where the temperature is permanently too low, for in cold places people can create the right temperature by means of houses, fires, clothes, and exercises; whereas no one has yet found any practical means of overcoming the heat. The fact that mental activity is probably most stimulated where the outdoor temperature averages about 40° F. makes the tropical heat still more harmful. When the depressing effect of constant monotony and too much moisture is added to all this, it is not surprising that although tropical people sometimes work long and laboriously, they almost never show the zest and energy characteristic of northerners, and rarely do any deep thinking. With the exception of Mohammed no great man of the first rank is known to have been born and brought up within 25° of the equator, even Gautama, the founder of Buddhism, having grown up in latitude 27° N. at the foot of the Himalayas.

(*c*) *Effect of Tropical Diseases.*—The unfavorable diet and climate of the tropics produce their worst effects through disease. People who are weakened by a poor diet or an unfavorable climate readily succumb to such organisms as the hookworm, which afflicts hundreds of millions of persons in warm and tropical climates. In Egypt half the laboring population is infected with hookworm, in the Malay States 60 per cent, British Honduras 70 per cent, the Philippines 15 to 75 per cent according to locality, Sumatra and Java as high as 90 per cent in some regions, and so on for almost all tropical countries.

' According to the estimates of the Rockefeller Sanitary Commission about 940,000,000 of the 1,600,000,000 people of the world live in areas where hookworm disease is prevalent. Half the people within the tropics probably suffer from the disease at all times, and many others have it at some time during their lives. It stunts the growth of children, retards their mental development, and makes adults anemic and incompetent. In Costa Rica 66 laborers before being treated for hookworm disease normally cultivated 563 acres of coffee monthly. After treatment they cultivated 750 acres. In India the amount of work increased 20 per cent on one estate and 50 per cent on another, and on both was of better quality than before the laborers were treated; reports from British Guiana indicate that the efficiency of the laborers employed by one company increased from 25 to 50 per cent after measures to eradicate the hookworm were put into operation.

The harm done by insects and bacteria in tropical countries can scarcely be measured. Yellow fever, which formerly killed people by the hundred thousand, is carried by a mosquito which thrives only in low latitudes. Essentially the same is true of malaria, which occurs sporadically and of mild character in cool countries but becomes even more dangerous than the hookworm disease within the tropics. The old idea that tropical people are immune to such diseases is no longer accepted by students of tropical medicine. Adults, to be sure, are often immune, but frequently at the expense of vitality. Vast numbers of children die in infancy and early childhood from malaria or from diseases to which the weakening effect of malaria renders them liable. Others suffer and recover, but they bear the results with them to the grave in the form of enlarged spleens, anemia, and dulled mentality. Add to these diseases the irritating bites of flies, ticks, and other noxious insects and it is evident that a community afflicted with such disorders cannot be efficient or rise high in the scale of civilization.

(*d*) *Ignorance and Lack of Hygiene.*—The poor diet, debilitating climate, and prevalence of diseases prevent tropical people from improving their own condition. They may know that keeping clean, procuring a varied diet, and suppressing mosquitoes and vermin would greatly improve their health, but they lack the mental and physical vigor to do these things. They live in a vicious circle where climate causes poor diet and debilitation, and favors harmful parasites. These circumstances lead to disease, and the diseases weaken the people still more so that they have not energy enough to improve their own condition. Many good authorities believe that unsanitary practices are the most important and also the most easily overcome of all the tropical handicaps.

(7) *Difficulties of Tropical Transportation.*—In most tropical countries transportation is very backward. Heavy rains, superabundant vegetation, weakness among the animals, and lack of vigor and inventiveness among the people make it difficult to build and maintain roads, or to lay up the capital which is essential if the means of transportation are to be permanently effective. For example, on the Madras Railroad in India 40 per cent of the ties have to be renewed each year; on the Tehuantepec Railway work had to be suspended because of the loss of workers through disease; and during the building of the Indian railway from the Portugese port of Goa to the main British system 63,000

patients were treated. Because of such conditions tropical countries contain scarcely a mile of macadam road, tram line, or railway which has not been either built with capital and machinery from outside the tropics or superintended and equipped by people from cooler climates.

(8) *The White Man in the Tropics.*—The preceding sections show that conditions of race, climate, vegetation, health, and transportation have prevented tropical people from making any important contribution to the world's business when left to themselves. Nevertheless tropical regions are today the greatest unused reservoir of wealth. Such tropical products as sugar, rubber, quinine, cocoa, dye-wood, and coffee are becoming an absolute necessity, while tropical lumber may soon be of great importance. The only way to procure such products is for white men to go to tropical countries and live there, at least temporarily. This raises the following questions which are among the most important problems of tropical business: (1) What is the effect of a temporary sojourn within the tropics upon white men in positions of responsibility? (2) Can white laborers and farmers permanently colonize within the tropics, and is it advisable that they should do so? (3) In what ways can the efficiency of the native people be most improved?

There is some difference of opinion as to the answers to these questions, partly from lack of knowledge and partly because relatively healthful and invigorating islands like Hawaii are as different from the unhealthful forests of the Amazon as England is from Egypt. In what follows we shall speak of the regions such as the East Indies, southern India, and northern South America, where the possibilities of plantation agriculture are greatest.

Effect of Tropical Climates on Health of White Men.—Experiments show that when people are kept from morning till night in temperatures of 75° their hearts beat over twenty times per minute more often than when the temperature is 68°. This is because the blood must circulate rapidly through the lungs and skin in order that increased evaporation may prevent the temperature of the blood from rising too high. But even with the extra work of the heart the temperature of the blood rises more rapidly than in cooler places if people engage in physical labor. In tropical countries, the white man is permanently under a strain of this sort. The body adjusts itself to the heat and to the absence of the stimulus due to changes, but at the expense of general activity. The effect is like that of lengthening the pendulum of a clock; the mechanism still works, but more slowly than before. People do not feel disposed to work and to take exercise; the various organs such as the liver become clogged; and the mind finds it difficult to think clearly and accurately. This need not prevent northern races from living in tropical countries and doing good work, provided they work slowly and escape parasitic diseases. The weakened condition of the body, however, makes it difficult to resist disease, and also makes people careless about preventive measures, such as exercise and sanitation.

Effect of Health upon Character.—The health of northerners who stay long in tropical countries is often reflected in their character. A man of strong character may retain that character, but in many cases the weak spots become more evident than at home. The weakness may manifest itself in various ways according to individual temperament, for example, in disinclination to work, in an irascible temper, drunkenness, immorality, gambling, untruthfulness. Practically every northerner who goes to the tropics says that at first he works as well as at home and finds the climate delightful, or even stimulating. Little by little, however, he is likely to slow down, and the spirit of ambition pricks him less keenly than before. After a long sojourn it is hard to spur one's self to a mountain climb, and equally hard to think out the long steps in a chain of reasoning. Young Englishmen of the highest types in the Bahamas say that when they come they think nothing of a walk of twenty miles, but after a few years they dread the thought of two. Such men also say that at first they read solid books in the evening, but within a few years cannot concentrate on anything that requires much thought.

The relative prevalence of drunkenness, immorality, gambling, and dishonesty among a certain large group of white men in tropical countries is due both to physiological and social causes, but in either case the harmful effect upon business cannot be ignored. For example, even if liquor is no more abundant in tropical regions than elsewhere, the tired feeling which is common in the torrid zone makes men want something which they suppose will brace them up. The same conditions apply to other weaknesses. Not only do the low standards of tropical countries influence the white man who goes there to live, but temptations seem stronger than at home because the climate and the diseases weaken people's power of resistance. This is especially the case because in tropical countries many men are cut off from the social restraints which do so much to make most people upright and useful in their own homes.

Antidotes to Tropical Weaknesses of White Men.—All this does not mean that the white man cannot successfully carry on business enterprises and maintain high standards of character in tropical countries. The men who maintain such standards through a long life in tropical countries are generally those who pay special attention to keeping themselves "fit." Many keep fit by carefully regulating their diet, by refraining from alcoholic liquors, by having work which interests them and keeps them absorbed, and especially by systematic exercise.

Among the native people the same rule holds true. Among those Filipinos who are partly of European descent, many are being built up physically by the athletics which Americans have introduced. There is probably more need of judicious and systematic exercise in tropical countries than in those where the climate is more bracing.

Such conditions mean that every wise business enterprise in tropical countries must do at least three things: (1) it must spend money freely on the health of its employees; (2) it must give frequent and long vacations so that the employees and their families may go home before they show signs of weakening; (3) it must promote exercise and all sorts of wholesome forms of recreation, especially out-of-doors; and (4) every possible effort must be made to maintain high social standards, and the white men must have their own community as separate as possible from the people of the country. Even if men must travel about among the natives they should regularly spend long week ends in a community of northerners. To some people such precautions seem unnecessary and almost unbusinesslike, but the most successful corporations such as the United Fruit Company are the ones that practice them most fully. They pay in the long run, for the riches of tropical lands are enormous, and the thing that is most needed there is wise, efficient, energetic, sympathetic, and reliable men to manage the native labor. Hawaii, and to a much less extent, Java and Jamaica stand high in this respect.

White Labor in Warm Countries.—What is true of white men in the higher positions is far more true of those engaged in manual labor. But the expense of the precautions needed to enable white men to thrive in debilitating climates, especially if their families are to be kept in health and vigor, is so great that few lines of business can afford to keep many white laborers in the tropics. Perhaps some day this will be possible, for in Porto Rico, Cuba, and especially Hawaii, white labor seems to be fairly successful But all of these are islands which are unusually favored climatically because of the trade winds. Queensland is trying to establish a continental colony in her northern territory, but it is too new and too largely composed of people who were born and bred elsewhere to offer any proof as to whether white labor can permanently endure such a climate.

The Improvement of Tropical Labor.—It appears from all this that if the white man is to develop the wealth of tropical countries, one of his first tasks is to take care of the tropical people. Nothing so handicaps and exasperates the tropical planter as the slowness, inefficiency, stupidity, and especially the unreliability of most tropical laborers who work today and are idle tomorrow according to their feelings.

The foundation of this trouble is partly race, but much of it is health, while lack of training and the absence of strong incentives to work are also important. If white men are to realize the vast possibilities of tropical countries one of the first steps is to eradicate the worst tropical diseases. Yellow fever has already almost disappeared, but its ravages were unimportant compared with those of the hookworm disease and malaria. With the eradication of disease must go a change in diet so that the tropical laborer will have enough food at all times and a sufficient variety to insure a fair balance of proteids, fats, and carbohydrates, and an ample supply of vitamines. That it is possible to eradicate disease and improve the diet is proved by the experience of the United States at Panama and by plantations run by the British and Dutch in the Malay Peninsula and Java. It is not enough, however, to help the men who are now actually at work. They have already acquired a degree of inertia and incapacity which they can never overcome. What is needed is to see that the mothers and children are well fed and kept from disease. If a new generation can grow up with relatively strong bodies and with minds that are not benumbed by poor food, malaria, hookworm, and other diseases, they will be better able to profit by the training which many philanthropic people are offering them. Such training needs to be not merely intellectual, but moral and physical and to include hygiene and athletics. Healthy tropical children with such a training will presumably grow up not only with better capacities and higher ideals than their parents, but with new desires for the many conveniences and luxuries which serve as incentives to keep the people of more energetic lands hard at work.

Rice Growers; the Highest Native Tropical Community.—Having seen the conditions of agriculture, health, and labor in tropical countries, let us examine the highest type of agricultural community evolved by tropical people unaided by others. The people of such communities raise rice, and are what might be called intensive one-crop horticulturists. They have risen higher than any other type of tropical communities partly because rice is one of the best tropical foods, partly because its cultivation requires more care than that of most tropical crops, and partly because rice users live in compact, permanent communities where the opportunities for progress are especially great. In a typical rice-raising community such as Java most of the people live in huts made of poles and covered with high roofs thatched with palm leaves or some similar growth. The houses are usually quite close together, there are abundant trees wherever they have not been cut off, and the roads are usually rough cart paths. As a rule the rice fields are terraced. The necessity of terracing the fields in such a way that water may flow over the rice very gently and pass from level to level, calls for an infinite amount of patient labor in fashioning and repairing banks of mud and in arranging canals. The care required in cultivating the land, manuring it, plowing it with bullocks, raising water to the proper level to flood the fields, transplanting the rice when it is partly grown, drawing off the water at the right time to permit the crop to ripen well, and carefully harvesting, threshing, and preserving the grain has greatly aided the development of a rather high degree of industry and skill similar to that found among market gardeners. Though the rice-raisers of China and India work slowly, they make much better laborers than almost any other tropical people.

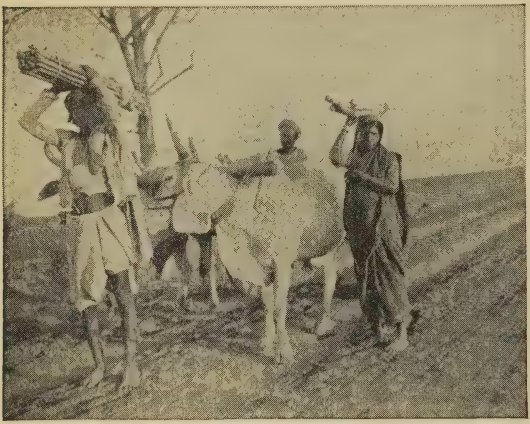


Fig. 47.—Indian Peasants with Plow Bullocks and Sugar Cane.

The intensive cultivation employed in growing rice may be judged from the table on the next page showing an estimate of the work needed to raise an acre of rice in the Himalayan district of India.

The most significant thing about this table is the great number of people who work on a single acre of land,—a result in part of the density of population,—and the number of days of work needed to produce a relatively small amount of food. If these people worked 10 hours a day, and they probably work more, each bushel of rice would require about 36 hours of work, or 12 times as much as was needed to produce a bushel of wheat in the United States previous to the invention of modern machinery, and about 200 times as much as is now needed. Obviously people who produce so little in proportion to their time cannot have a large surplus, and cannot demand much from the outside world. Hence, the rice raisers' part in the world's business is very slight.

The prices in the rice table apply to the time before the Great War, because present prices are still too unstable to use. They seem so ridiculously low that one wonders how the rice-growers can live. Reckoned in purchasing power, which is the best way to reckon wages, the Indian farmer before the Great War was receiving less than one-sixth

Four plowings, requiring the work of one man and a pair of bullocks for 12 days at 3 cents per day	$0.36
(The fact that a man and his two bullocks require three days to plow an acre illustrates how slowly the tropical people work and how inefficient are their animals and the little wooden plows often not even tipped with iron.)	
Manuring, 4 men for one day	0.08
80 pounds of seed	0.32
One plowing and harrowing after seeding, 3 teams, one day	0.09
One weeding, 20 women, one day	0.40
Repairing levees, 16 men, one day	0.32
Reaping, 16 women, one day	0.32
Carrying to threshing floor, one man and a pair of bullocks, one and one-third days	0.04
Threshing, one day's work of 4 men at 2 cents and 10 bullocks at one cent	0.18
Cleaning and winnowing, 3 men, one day	0.06
Rent of first class land per acre	0.96
Other expenses	0.12
Total expenses	$3.25
Total yield, about 1000 pounds (22 bushels) of unhusked rice or paddy, worth about	3.85
Total number of days of work by men or women	79⅓
Total number of days of work by a pair of bullocks	44

of a bushel of rice per day for his own work or that of his wife, and half as much for the capital represented by each bullock. At the same time, the real pay of the American farm laborer was then and is now perhaps twelve times as great in purchasing power as that of the rice farmer. In other words, because of his greater racial capacity, better climate, and the other advantages belonging to his geographical location, the American farm laborer was worth approximately twelve times as much as the tropical rice farmer. The need of the farmers for food for themselves and their families was about the same, but the rice farmer could scarcely satisfy his need, while the American had enough surplus so that he could afford to exchange it for a great variety of foods brought from widely separated places; he added to the world's business by spending much money on clothing, rent, fuel, and simple luxuries. On the other hand the rice farmer and his family made most of their own clothing and house, gather the few sticks that they needed for fuel, and contributed only the most meager surplus to the business life of their own community.

Plantations: The New Type of Tropical Community.—The most essential features of tropical plantations are: (1) they are almost invariably owned and managed by men from the more stimulating climates, chiefly Europeans, North Americans, and men of Spanish descent, but sometimes Chinese or Japanese; (2) they usually raise products whose main use is not to supply food locally, and which are consumed far from where they are produced; (3) they are subject to the difficulties of the one-crop type of agriculture; (4) they are often highly profitable and are perhaps increasing more rapidly than any other type of agricultural community. The chief products raised on plantations are as follows: (*A*) *Spices and Condiments*: vanilla, pepper, cloves, nutmegs and mace, ginger, allspice or pimento, cinnamon and cassia, cardamom; (*B*) *Fruits*: banana, pineapple, avocado or alligator pear; (*C*) *Drinks*: coffee, tea, cocoa; (*D*) *Other Foodstuffs*: sugar, palm oil; copra and cocoanut oil; (*E*) *Drugs and Sedatives*: quinine, coca, tobacco; (*F*) *Fibers*: cotton, sisal, Manila hemp; (*G*) *Other Raw Materials*: rubber. Other minor products might also be mentioned, for the number and abundance of plantation products is increasing rapidly. Sugar and to a less extent bananas are the only two products which form really important articles of food, and as these contain little or no proteid, an attempt to live on them would quickly produce ill health. The other foodstuffs, spices, fruits, and drinks, although important in business, could all be dispensed with without seriously impairing the value of the ordinary diet of any part of the world. In the same way tobacco fills no

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FIG. 48.—The Hemp Industry in the Philippines.

important need and is entirely a luxury. Thus, in addition to sugar and bananas, the only plantation products that are really essential are the three fibers, quinine as a remedy for malaria, and rubber.

Difficulties of the Planter Who Tries to Raise Food.—In view of the world's need of more food it seems strange that tropical countries with all their possibilities have not been more fully utilized. The experience of an American who tried to raise corn in Mexico illustrates the difficulties of tropical farming. This man knew that in Mexico the farmers cling to primitive methods so persistently that "not even a modern hacienda (owned by a man of Spanish blood) can be any more up-to-date than its peons will allow." If left to their own crude methods, the peons plant corn in holes made with a pointed stick or in soil turned up by a plow which, though it scratches the earth only to the depth of a finger, is as large as the underfed cattle can draw. The native hoe weighs between three and five pounds, and harvesting and threshing are done by methods described in the Bible. The American wondered, as others have done, why he could not purchase a farm in Mexico, use scientific methods, and harvest a fortune, since the natives with crude implements and little skill can extract a living from the soil. Accordingly he imported American machinery and was delighted to find that his corn gave promise of yielding in proportion to the excellence of his methods. But he soon discovered how exceedingly discouraging is the gauntlet of handicaps one must run who attempts to raise food in tropical Mexico. Although the Mexican soil and weather gave him a luxuriant growth of corn, it also gave an ant to eat the germs from some of the seeds before they had sprouted, a cut-worm and blackbird to attack the seedlings, an army worm to ravage the plants when knee high, another bird and worm to attack the maturing ears, parrots, parrakeets and raccoons to devour the ripened ears and a black weevil to develop in the kernels after they are shelled. Moreover, there is always the danger that the rainy season may begin before the crop is harvested. He also discovered that war on weeds and bushes rather than on men is the chief reason why the Latin American farmers are constantly armed with their sharp, long-bladed machetes. Sugar planters have indeed overcome many of these difficulties, and if the economic need should arise, they might be overcome for corn also.

All this illustrates the important fact that throughout all but the drier and more elevated parts of the warmer zone the raising of food crops has thus far been successful only in the haphazard way of the primitive tropical farmer or in the highly intensive way of the rice farmer. Tropical countries still await a system of agriculture which shall afford a large yield per acre with a small amount of labor. When that system is perfected the plantations may be expected to raise food as well as luxuries, and to be self-supporting instead of relying in part, as they now do, on cooler climates.

The Sugar Plantations of Cuba.—The sugar plantations of Cuba illustrate the profitable nature of plantation agriculture. According to the official estimates of the Cuban government a capital of about $10,000 is needed in order to start a sugar plantation of 100 acres. Aside from the land and buildings the necessary equipment consists of oxen, a traction plow, and several carts each large enough to require 6 or 8 yoke of oxen. The ground must be cleared, plowed, planted with cane cuttings, and cultivated at least once, but thereafter the canes often choke the weeds. Some farmers claim that it pays to make rough paper out of the "bagasse" or fiber of the pressed canes and pin this to the ground between the rows of cane. As the cane spreads, its sharp tips penetrate the paper, but most weeds cannot do so. Thus no cultivation is needed, and the canes do not have to compete with weeds. A year or more after the canes are set out, the laborers strip off the leaves, cut off the tops, and load the canes on wagons, while the leaves and tops are left as a mulch. The canes are crushed and the juice is reduced to sugar in a large mill equipped with modern machinery. Returns of fifty to a hundred per cent on the capital invested are sometimes made, but the crop varies greatly and so does the price of sugar.

The laborers who work on the sugar plantations rarely raise even a small fraction of their own food, nor do other farmers in Cuba raise a surplus sufficient to feed them. Hence, Cuba's imports of food per capita rival those of England. Because Cuba is so dependent on imports, she is vitally interested in the success of the Newfoundland fisheries, the troubles of the Mexican and Texan oil fields whence comes fuel for the tractors, and the strikes of the Pittsburgh district whence comes heavy machinery for the sugar mills and rails for the tramways. Even the variations in American politics may have an immediate bearing on every Cuban sugar grower because of possible changes in the tariff. The importance which the sugar plantations assume in the trade of the United States is illustrated by the fact that a fourth of all the American motor trucks and pleasure cars which this country sells to Latin America go to the one small country of Cuba. In proportion to its population that country spends more than any other in the American market. The sugar crop alone yielded $107 per capita in 1920–1921.

Sisal and Rubber Plantations.—Other types of plantations are likewise important in the world's business. In Yucatan a peculiar fitness of soil and climate for the henequen plant, a sort of agave resembling the century plant, helps to make that region one of the most prosperous parts of Mexico. The discovery of the strength and value of the sisal fiber contained in the henequin leaf caused a demand for it in the industrial centers and shipyards of the civilized world and especially in the American harvest fields. It is distasteful to crickets and grasshoppers, and hence the bundles of grain tied with sisal are cut by these pests much less often than are the sheaves tied with cord made of cotton. The large demand for sisal has not only created many Spanish millionaires in Merida, the capital city, but causes Yucatan to stand next to the Tampico oil region as a part of Mexico in which Americans are much interested.

In the same way, the demand for rubber and the suitability of soil and climate for the rubber plant on islands like Sumatra have caused millions of dollars of American and British money to be invested in the groves of rubber trees cultivated on these islands. There, more than in most plantations, the foreign owners have taken great pains to improve the conditions of health by draining marshy places, putting some of the brooks under ground, and providing medical attendance, hospital care, and above all complete isolation from mosquitoes for the sufferers from malaria. Such activities pay, and are making the plantation owners realize that the system of virtual peonage which prevails on many old-fashioned plantations, as in Mexico where the Yaqui Indians were treated almost as slaves, is a financial as well as a moral mistake. This growing realization of the importance of health and efficiency is one of the most hopeful signs within the tropics.

Today the plantations are chiefly found on seacoasts, especially on the islands of the East and West Indies. The coasts are not only the regions where level plains are most easily accessible, but where the conditions of health are best, aside from the highlands. Little by little the plantations tend to move inward. Thus tropical countries are being invaded by influences which gradually tend to promote health, increase the capacity of the people, make them more capable of receiving education and training, and raise their standards of living. These are the best methods of making the warm parts of the earth a valuable factor in business.

EXERCISES AND PROBLEMS

1. Study the distribution of rice culture. On a map of the world shade the rice-producing countries (Table 11 F) in three grades according to the production per inhabitant (Table 12 F): (1) Under 10 pounds per person (10,000 pounds per 1000

persons), (2) 10 to 100 pounds per person, and (3) over 100 pounds. What geographical or other conditions pertain in common to all the countries in any one of these three grades? On another map shade the rice-producing countries in three grades according to their production per acre (Table 13 F): (1) Under 1000 pounds per acre, (2) 1000 to 1500, and (3) over 1500. What conditions pertain in common to all the countries in each grade? Explain the main differences between your two maps, paying special attention to the effect of climate versus stage of progress.

2. Study sugar culture (Tables 11 J, and 12 J) in the same way as rice culture. Explain why certain countries have so marked a preponderance in this product. On the basis of latitude and of your general knowledge draw a line separating cane sugar from beet sugar. The *Geography of the World's Agriculture* will help you in this. Write an account of the geographical contrast between the regions most favorable to each of the types.

3. Let several students work together to compare various countries as to their importance and progress in tropical agriculture. From Table 12 make a table of all the countries which annually produce over 20,000 pounds of rice and 5 tons of *cane* sugar per 10,000 people. Add all the information available in Tables 11, 12, 13, 14 and 15, and also Tables 1 and 9. Discuss the indications of your table as to the relative productivity and progress of the regions where tropical agriculture is best developed.

4. *The Effect of Vegetation on Tropical People.*—Prepare a generalized map of the density of vegetation within the tropics (see Philip's Comparative Wall Atlases) and a map of density of population (Table 1). Under what conditions of vegetation are the tropical countries most densely populated? What tropical industries are best suited to each type of tropical vegetation? Locate on the map the large tropical cities (Table 4). What conditions have a special effect on the growth of cities in the tropics?

5. Obtain all the information possible from the tables in this book and elsewhere relative to the Belgian Kongo. Prepare a statement showing the effect of geographical conditions in that country.

6. Let the class discuss the following facts concerning the Panama Canal Zone and draw conclusions as to (*A*) the effect of medical progress on the habitability of tropical countries; (*B*) the relative healthfulness of Panama and the United States.

I. Mortality Among Canal and Railroad Employees in the Canal Zone.		II. Mortality in the Registration Area of the United States.	III. Mortality in the City of Panama.	
1881–1890	61.4	....	1891–1900	43.4
1904–1913	15.1	14.9	1901–1910	48.5
1919	8.4	12.9	1911–1914	31.8
1920	9.5	13.1		

IV. The Zone is a military reservation where the United States Government enforces strict sanitary regulations. V. The employees are chiefly men from twenty to forty years of age who are vigorous enough to go away from home to get work. They usually stay in the Zone only a few years, for the government means to send them away as soon as they show serious signs of ill health. VI. In the original Registration States (N. Eng., N. Y., N. J., Ind., Mich., and D. C.) the average mortality of men of these ages during 1909, 1910, and 1911 was as follows: (*a*) ages 19–20 years, 4.6; (*b*) ages 29–30 years, 6.5; (*c*) ages 39–40 years, 10.1. For the years 1919 and 1920 these figures averaged about 15 per cent lower than for 1909–1911, but have not yet been calculated exactly by the government experts.

CHAPTER XIII

THE WORK OF THE LUMBERMEN

Why Lumbering is a Relatively Backward Industry.—In studying the people who depend upon animals and upon tropical agriculture we saw that the permanence of a community has much to do with its civilization and progress. Almost no type of civilized community is more transitory than the lumbering community, and the standards of living are correspondingly low. This is because lumbering is not only an *extractive* but an *exhaustive* industry. Like hunting, fishing, farming, and mining, the lumbering industry extracts from nature a primary product. It also exhausts the supply of nature's gifts without making much effort to replace them. Thus for centuries the world has been growing poorer in forests almost as rapidly as in minerals, and far more rapidly than in animals, fish or soil.

The rapidity with which lumbering exhausts the supply of trees in a given region causes the industry to be highly transitory. As soon as the merchantable timber has been cut off within easy reach of a camp, the lumbermen must move on or be idle. The work of cutting the timber proceeds so rapidly that it is not worth while to build good houses, and the lumbermen live in rough shacks or log cabins. In many cases the men are housed in long bunk-houses, which are not much more than closed sheds containing bunks along the sides where a score or more men can sleep in one room. Only when the policy of forest exhaustion gives place to conservation and slow steady use of the timber can the lumber industry become permanent and thus maintain high standards of living.

Because of the nature of the industry lumber camps are located in sparsely settled districts and the lumbermen are thus isolated from other communities. By reason of the rough life and transitory character of lumbering communities, women and children are rarely found in them and the social life frequently degenerates to the crudest types. Nevertheless the work in the lumber camps rarely attracts any but the strongest men, and their feats of prowess and endurance add romance to the industry. There is also a considerable percentage of high grade men among the lumbermen—enough to keep the work going fairly steadily in spite of the great labor turnover among the less competent.

Many of these men are pioneer farmers who clear and till their farms in the summer, and work for the neighboring lumber companies in the winter. Many thrifty Scandinavian farmers in northern Wisconsin and Minnesota are lumbermen in this sense.

The More Attractive Side of Lumbering.—If it were not for its transitory and lonely nature, lumbering as carried on in the best camps would be a wholesome and invigorating occupation. Few ways of living are better for a man's health, or more appealing to one who is young and vigorous than to tramp through the forest with axe and saw; select the right tree; and fell it with mighty strokes so that it falls crashing to the ground in just the right spot. It is fascinating work to hook the log to a long chain and " snake " it out from where it fell, watching it as it bobs along among the bushes, steering it away from the trees and finally rolling it onto the chute where it slides down to the valley bottom, or onto the little open cars which carry it to the mill. The work of the lumbermen is good not only for the health but for the brain. Some parts of the work demand very quick judgment, and quick action. The men in the mill must decide just how each log is to be cut, for no two logs are alike. Out in the forest each man is to a large extent his own boss, and so learns self-reliance. Still more is this the case when a lumber drive is in progress and a jam must be broken out where the logs have become wedged together because of an obstruction in the river. This outdoor life where quick wits and strong muscles are at a premium makes the ordinary lumberman love his work, and would make the lumber industry a good place for training vigorous, self-reliant young workers if only it were more permanent and less lonely.

Even though lumbering is one of the simpler industries it involves a number of diverse operations as appears in the table on the following page.

How Sweden Tries to Raise the Standard of the Lumbering Industry.—In almost no country are the problems of the lumber camp relatively more important than in Sweden. There lumbering is the most important industry aside from agriculture. The saw mills and planing mills alone employ about as many men as all the iron mines, smelters, steel mills and machinery factories for which Sweden is famous. Accordingly the Swedes are doing their best to make lumbering as permanent an industry as possible. The many short parallel rivers running southeast across Sweden to the Baltic Sea furnish transportation for the lumber in such a way that if a company obtains control of a considerable part of one of the relatively small watersheds it can generally find a single convenient location for its saw mills, furni-

The Lumber Industry
- 1. The Logging Industry
  - A. Raw material—Standing timber
  - B. Process
    - Felling trees
    - Cutting into lengths
    - Transporting to mill by
      - *a.* Rail
      - *b.* Water
      - *c.* Skidding
  - C. Finished product—logs
- 2. The Saw-mill Industry
  - A. Raw material—logs
  - B. Finished product—rough lumber
    - beams
    - joists
    - scantlings
    - boards
    - shingles
    - laths
- 3. The Planing Mill Industry
  - A. Raw materials—rough lumber
  - B. Finished product—planed lumber

ture factories, and paper plants on the lower part of the stream, and thus give great permanence to all parts of the work except the actual cutting of the trees. In many cases the Swedish lumber crews are considered permanent labor, and some saw mill companies furnish houses and gardens for their men.

With this attempt to make lumbering a permanent occupation for the sake of labor, there goes a similar attempt for the sake of making the land yield a steady return. Good forestry practice in the United States as well as in Sweden and other European countries means that the trees are not all cut at once. Only mature trees fit for lumber are cut while young trees are allowed to grow. In the long run this is profitable, for it means that a steady supply of good trees is available year after year from a wide area instead of an equal number of trees partly good and partly bad from a smaller area. Moreover, it permits the most desirable kinds of trees to be raised almost everywhere. The present practice is bad because of what is known as the "succession" of vegetation. When a piece of forest is cut off, the trees that spring up are not necessarily of the same variety as those that were cut. For example, suppose a forest of white pine, which is one of the most valuable trees, has some admixture of hardwoods such as maple, beech, hemlock, and yellow birch. When it is cut the new forest is likely to contain relatively little white pine and much hardwood because hardwood seedlings, being relatively tolerant, as the botanists say, are more numerous in the shady places of a well established forest than pine seedlings. If the hardwood forest is cut off and is burned over, as often happens, the next growth will contain a large percentage of such relatively poor species as birch and aspen, because these can thrive in an impoverished soil better than can the hardwoods. Another cutting and another fire will increase the percentage of birch and aspen. Thus as a general rule the second growth is not so good as the first, and the third and fourth are still less valuable. But with proper forest conservation, there is nothing but growth of the desired type. Often where no conservation is practiced and big companies have swept away the most valuable trees of the virgin growth, small companies have to be content with the second growth, while the third is cut only for pulp wood for paper.

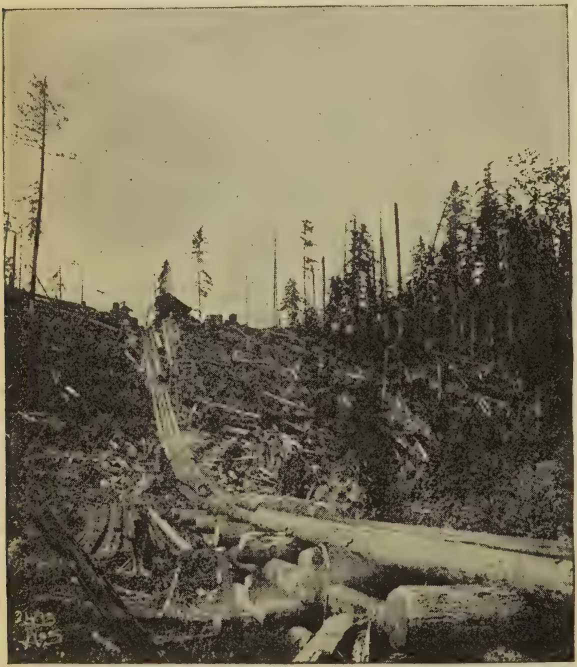

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FIG. 49.—A Lumber Chute.

Transportation and the Lumber Industry.—Few industries depend upon transportation more closely than does lumbering. In the first place the product is bulky and heavy in proportion to its value. In the second place, lumber comes largely from rugged or backward regions where the population is scanty and the roads poor, and third, practically none of it finds a market where it is cut, for the consumers live chiefly in the lowlands and the cities.

Among the lumber camps the methods of transportation show interesting differences according to climate. In snowy regions like New England, Wisconsin, Sweden, Canada, and Russia the commonest form of transportation is by sledges over the snow in winter and spring. This is cheap because the deep snow covers all the irregularities of the ground, even the stumps left in the rough wood roads. When packed by the runners of the two and four-horse sleds, and especially when watered to produce ice, the snow forms a glassy pavement over which enormous loads can be hauled with ease.

Wherever possible, the lumberman makes use of kinds of transportation where he has no expense for power. A vast amount of lumber is floated down the rivers, especially in snowy and glaciated regions. The snow helps by creating spring floods which make many small streams temporarily large enough to float logs. Glaciation has helped by making the topography irregular and thereby increasing the number of streams and also lakes. The lakes of glaciated regions like Sweden, New England, and Minnesota, likewise assist in lumbering, for they form collecting basins in which the trees from the surrounding areas can be gathered either for a saw mill, or preparatory to being floated farther toward the sea. In a rugged region the logs are slid down over the snowy hillsides, or else chutes are used. These are merely steep troughs down which the logs slide to the foot of the slope. Flumes are also common and are much better than chutes. These are troughs into which a mountain stream is turned so that the logs float down to a lake, river, or mill.

In the South and West where there is little snow and where the trees are often of great size, transportation is more expensive than in New England and Minnesota. Huge pairs of wheels are used and the logs are fastened beneath the axle. Sometimes only one pair of wheels is employed and one end of the log is allowed to drag behind, but often the log is suspended from two pairs of wheels. In the bigger camps these methods of hauling by means of animals have almost wholly given way to steam power or tractors. Donkey engines, for example, snake the logs through the forest as already described, and then by means of a skidder, which is something like an electric crane, dump them onto flat cars or into chutes or flumes.

In places where rivers are not available, it is necessary to construct logging railroads. These are generally of flimsy construction, for the owners do not expect to use them long. As forest conservation becomes more general the roads and railways in the forested areas improve. In fact the greatest hope of making lumbering a permanent and hence a wholly valuable occupation, seems to lie in having such transportation facilities that the logs from any part of a forest can easily be transported to market, while the lumbermen can get to any desired region so quickly that they can live at home and carry on farming much of the time. The old-time isolated lumber camp, with its abuses, is disappearing. Its place is taken by a much more permanent and useful type of community.

Effect of Transportation on Ownership of Lumber Industry.—Transportation is in many respects the key to the lumber industry. For instance, the lumberman who wants to use a river must not only own the rugged region where his trees grow, but must own or rent an area beside the river as far down as possible in order to set up his saw mill. This gives the big company with much capital a great advantage over the small one. Again, the big company has an overwhelming advantage over the small one if railroads are needed, for the initial investment is so high that much land must be owned in order to make it pay. If the investment in railroads is heavy, it does not pay to move the tracks oftener than once in about twenty years. Hence, large companies seek to protect their railroad investments by buying up the timber for many miles around their mills. This is one reason why much of the timber of the United States is in large holdings. In fact about 11 per cent of all the privately owned trees in the country belong to three such companies. Small lumber firms who bargain every two or three years for a supply of standing timber cannot cut cheaply enough to compete with large companies. Often the best they can do is to invest in portable saw mills, buy the cutover lands at low prices, and make their profits from the second and third growths. The worst feature of the lumber industry, so far as ownership is concerned, is that vast holdings have been acquired by private interests which have paid little or even nothing for them. Such people care only for the profits and are not concerned that the crash of their trees means the wasteful destruction of what ought to be conserved for the future. In the United States the government forest reserves, established to counteract this difficulty and prevent its continuance, now number 168 and include over 290,000 square miles or nearly 10 per cent of the country.

EXERCISES AND PROBLEMS

Note.—Before working out the following problems it may be well to study the pages on lumbering in Chapter XXIV, or these problems may be deferred till that chapter is studied.

1. Production of lumber by states. From Table 28 B draw a map using the following symbols: solid rectangle, one billion board feet (one thousand million); solid square, 500 million; solid triangle, 200 million; circle, 5 million or less. Define the conditions of five chief areas of production from the standpoints of (*a*) climate, (*b*) relief, (*c*) density of population, (*d*) length of settlement, (*e*) facilities for transportation to regions of great lumber consumption. Explain the probable reason why North Dakota is omitted in the tables of the United States Forest Service.

2. Relation of production of lumber to density of population. From Table 28 C draw a shaded map with isopleths at 100, 200, 400, 800. Explain the scanty production per person from southern New England to Utah. How many factors play a part in this, and which is most important in each region?

The average consumption per person in the entire United States is about 300 board feet per year, but this figure is far greater in the manufacturing than in the agricultural sections. What parts of the United States raise more than the average per capita consumption? To what extent is the present distribution of an excess of production over consumption favorable to the progress of manufacturing?

3. Lumber production in 1918 in per cent of 1910. From Table 28 D draw a map with isopleths at 50, 100, 200. What states are included in the areas of extreme diminution in the cut of lumber? Are these regions of great demand? How great is their total normal production (Col. B), and their production per capita (Col. C)? Is the diminution there as important as in the areas where the cut in 1918 was from 50 to 100 per cent of the cut in 1910? How significant is the increased production where it rises over 200 per cent? Explain. In what three states is increased production of much commercial importance? Sum up your conclusions as to the present status of the lumber industry in the United States and the prospects for the future. Take into account the following figures in thousands of board feet showing the total production of lumber in the United States at various periods:

1880	18,087,000	1900	34,781,000	1915	37,012,000
1890	23,495,000	1910	40,018,000	1918	31,890,000

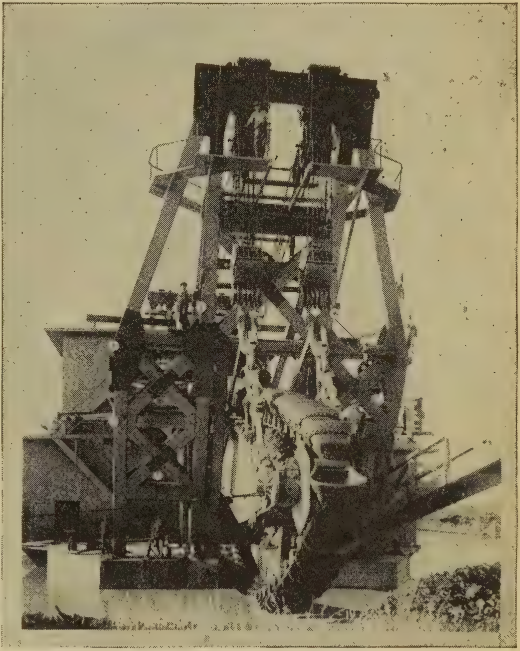
The increase from 1880 to 1910 is the natural result of the growth of the country in population, manufacturing, etc. Explain the decline since 1910.

CHAPTER XIV

THE PEOPLE WHO EXTRACT MINERALS

The Stages of the Extraction of Minerals.—The miner who digs coal or ore deep down in the earth is the most important of the people who extract minerals, but with him should be placed the quarryman, the driller for oil, and the humble digger of brick clay or gravel. All alike are engaged in the most destructive of the extractive industries, for they are wresting from the earth mineral products which no efforts of man can possibly replace, and which even nature can renew only after millions of years. This work has three chief phases, prospecting, or the search for minerals, development, or the work of estimating the supply and preparing to extract the valuable materials, and permanent mining or quarrying which is the main phase of the industry. The work of prospecting is rarely carried on by settled communities, for the old-fashioned prospector wanders about on foot hunting for bits of rock that look valuable, while the modern prospector is a geological or mining expert who lives in a commercial, industrial, or educational center and spends part of his time " in the field." Both types influence business chiefly by showing people where it is worth while to found communities in order to undertake the work of development and permanent mining.

The Prospecting and Development Stages.—The work of development is so closely associated with prospecting that the prospector is an important figure in the development community. Some such communities are extremely peculiar and picturesque. This has been especially true of gold-mining regions in the past and of petroleum regions at present. Such communities are full of the extravagance that usually goes with the sudden and easy acquisition of wealth, and with the alternate poverty and luxury which accompany the sudden gain and equally sudden loss of fortunes. They are not infrequently more or less lawless. Frequently they grow so rapidly that local committees take charge of the preservation of order before the government agencies are well organized. California in the days of the " Forty-niners," Australia, South Africa, the Yukon, and Siberia all furnish examples of rapid development in the case of gold, and Texas, Oklahoma, the Tampico region of Mexico, and Mesopotamia in the case of oil. Most gold towns, especially those depending on placer deposits, and practically all oil communities never get far beyond the stage of development, for the returns are much the largest at the beginning, while within a few years they greatly diminish. The production by permanent methods is often negligible. New South Wales in Australia, for example, produced about $8,000,000 worth of gold in 1898 during the boom period and only $1,200,000 in 1920. Such changes help to explain why mining investments often result in loss to the investors.



Courtesy, U. S. Bureau of Mines.

FIG. 50.—A Huge Gold Dredge.

With another group of minerals, including the ores of silver, copper, zinc, lead, tin, and some of the rarer metals, the chances of making fortunes in a year or two are much less than with gold and petroleum, for the product must be crushed, smelted and refined before it is ready for use. After the prospector has located the ore, it takes time to develop the mines, but when a mine is once well established it may have considerable permanence. Nevertheless, even with these products ore bodies are so prone to come to a sudden end that a steadily profitable industry is assured only when a single company owns so large a body of ore or so many different bodies that the supply cannot come to an end without warning. In such cases the geological structure is carefully studied by expert mining engineers or geologists who base their estimates of the available ore on trial shafts and drill holes which cover the whole property and the surrounding area and are the modern substitute for the haphazard studies of the surface rocks by the old-fashioned prospector.

With still other minerals such as iron ore, coal, granite and brick

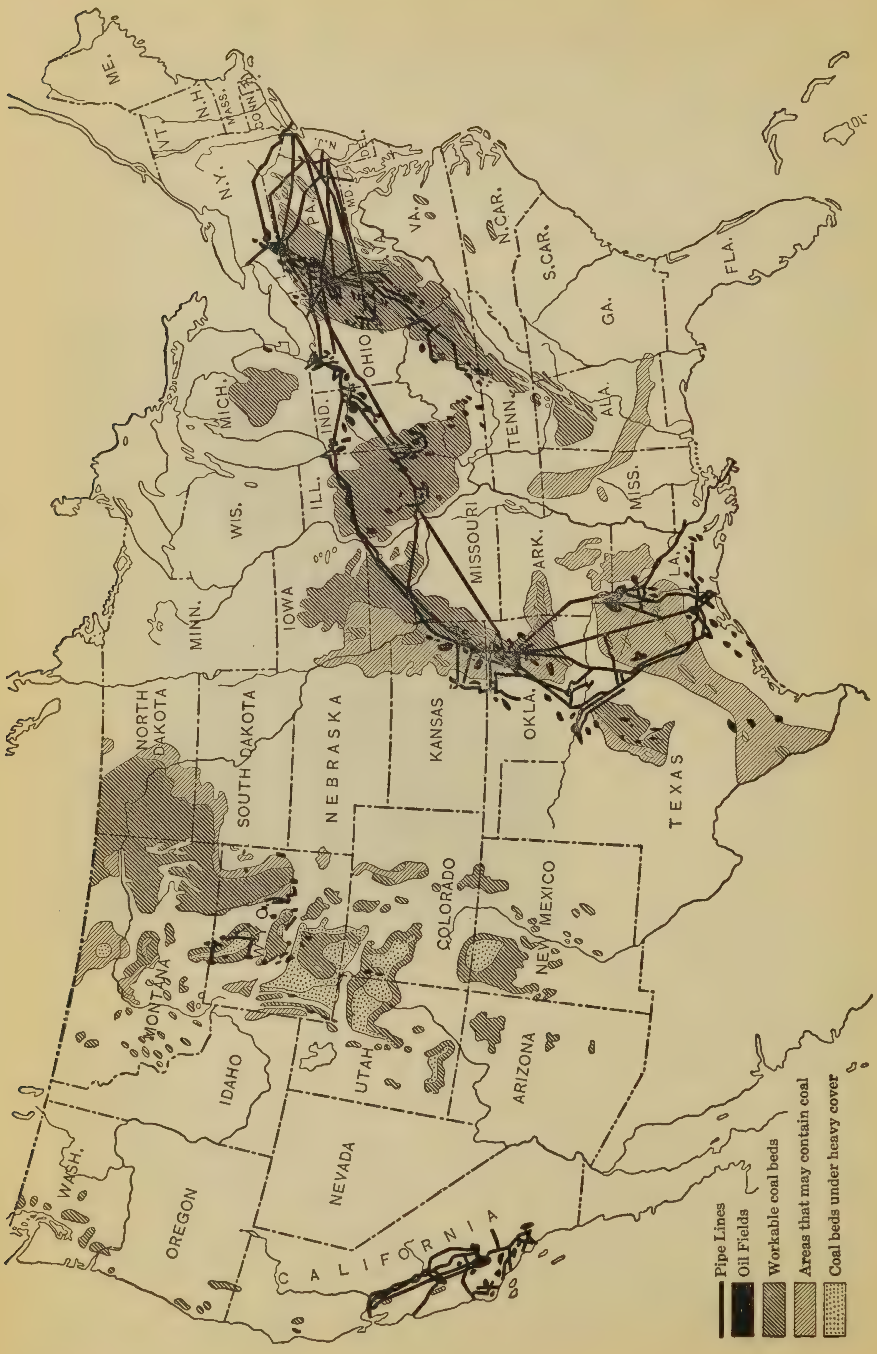


FIG. 51.—Coal Fields, Oil Fields, and Pipe Lines in the United States.

clay, the prospecting and developmental stages are almost eliminated. The geological expert can often determine at the very beginning approximately how much ore or mineral is available and how expensive it will be to get it out. Hence, a mine can be opened with exact knowledge as to how much capital is needed, how permanent and expensive the machinery should be, and what kind of town is likely to grow up. The coal-mining towns in Pennsylvania, Ohio, West Virginia, Colorado and other states are of this kind, as are the iron towns in Minnesota, and the stone towns such as West Quincy in Massachusetts, and Bedford, Indiana.

Petroleum as an Example of a Developing Mining Industry.—Oil has recently been the greatest American gamble. The people who have oil certificates tucked away waiting for the "oil to come in" are strong witnesses of this. An average production of about 4½ barrels per day for each oil well in the United States does not sound large. But a rise in total production from 40 barrels per day in 1859 to over a million at present sounds enormous. In the United States alone 30,000 miles of pipe-line are used to take care of the supply. Formerly, kerosene was the chief product and the gasoline, as well as the heavy parts of the oil, was a nuisance. Now the gasoline is the most important part, but there is plenty of use for the kerosene, and the 300 or more by-products made from the other parts are utilized in hundreds of industries. In the old days uncertainty as to the future, and the difficulties of transportation made capital slow to invest in oil. Now, in spite of the approaching exhaustion of the supplies, a five-fold advance in price in a decade (1910–1920) makes oil a most alluring investment. Even Wall Street, which is used to big things, was amazed at the way in which 300 million dollars of new capital was said to have been put into oil during the first four months of 1919.

How Oil is Prospected for and Developed.—Let us see what happens before Wall Street hears of a new oil center. Two or three men spend several weeks unobtrusively studying the geology of a region, locating anticlines or monoclines where invisible layers of porous rock lie between less porous layers and are tilted at such angles that oil may rise into them as into reservoirs. A little later other men quietly lease the right to drill for oil at perhaps a dollar an acre on as many farms as possible, with the provision that if oil is struck the farmer will get one eighth of it. This is called "wild-catting." The promoters may sell out to a big company or drill themselves. In the latter case they perhaps sell two-thirds of their leases to eastern brokers at $8 per acre and thus assure themselves a profit above the expenses of drilling even if no oil is found. The brokers in turn capitalize their purchase at perhaps $5 an acre, and sell stock so that if any one loses, it will be the public. A single producing well in a region often causes enormous speculation. Cases are not rare where a farmer has sold a quarter of his eighth for $10,000 and the promoter who made the purchase has capitalized this one thirty-second of a 160-acre farm at $100,000 and sold the stock. But the chances of getting oil are very elusive. One farmer may make two or three thousand dollars per month while his next neighbor makes nothing. In 1918, about 6000 of the 29,000 wells drilled in the United States were dry. One large oil concern bought 40 wells one year and only 3 proved of value. A small oil company in Texas was getting about 1500 barrels of oil per day, but wanted to make money faster. It drilled some more wells on the same general tract where the producing wells were located. Not only were the new wells of little value, but they so changed the conditions of pressure underground that the flow of the old wells fell to only 50 barrels per day. In one Oklahoma region in 1918, only one dollar's worth of oil was produced for every $555 of investment.

The Change from Hog-raising to Oil-drilling.—Here is a typical example of what happens in an oil boom. Some wildcat drillers brought in a well in a peaceful little township of Texas, where some fifty or a hundred people were raising pigs, 10 miles from the railroad. There was no hotel, no telegraph line, and only poor excuses for roads. But crowds of people poured in, rents soared, wells were rapidly dug, tanks and dams of earth were built to save the oil that poured out, pipe lines were laid down in a rush, stores were started in shacks. Soon the little hog-raising town had a thousand derricks; ten thousand people were living in tents, and walking on plank walks; not enough of them had resided there six months to incorporate a town. Trucks were still crawling in with loads of pipe and machinery; nothing except the cemetery was sacred from the oil driller. Both the Federal and State governments have tried to prevent waste in such cases by a system of fines. But when people are making $12,000 for each $100 invested, as happened in one case, they do not care how much is wasted. In a Texas town 10,000 barrels per day were recently wasted.

The Business of an Oil Community.—Such rapid development stimulates business. There is a demand for expensive machinery; the oil workers, the storekeepers, the extortionate taxi drivers, and everyone else in the town must be supplied with food, shelter, and clothing. Money is so abundant that prices rise to astonishing levels. The people who make fortunes are so extravagant that automobile makers say that such districts are among the best in the country for the sale of high-priced cars. But the business stimulated by an oil boom or any other mining boom is not permanently valuable. It introduces wild speculation, a sudden demand along various lines, and a sudden change in the supply along other lines. One of the worst features of business life, especially in the United States, is the great fluctuations to which it is subject. Any condition that brings a sharp fluctuation is harmful, whether it be drought, a great storm or flood, or an oil boom.

The correction of the evils connected with oil lies first in the work of geological experts. While the experts make some mistakes, they are far more nearly right than any other class of men who deal with oil or other mineral products. In the Osage Indian lands, which are unusually favorable to scientific investigation, the experts are said to have been right 87 per cent of the time. The drilling of a well costs \$8 to \$20 per foot and an average well there is 3000 to 4500 feet deep, and therefore costs around \$50,000. Hence, it pays to study the problem carefully before work is begun. There ought also to be some way of preventing people from drilling wells which they cannot cap at once so that no oil or gas will be lost. Also wells should not be dug so close together that one spoils the flow of another. The capacity of many wells is estimated at 5 to 10 times the amount actually obtained from them, and much of this might be saved by employing experts. The saving should be accomplished not only when wells are drilled but when they are apparently exhausted. By forcing air, gas, or water through sands where oil has ceased to flow, the life of the wells may be much increased. Some wells in Ohio are still yielding moderately after 40 years of pumping.

Another important effect of oil upon business has been the rapid growth of great companies, especially the huge Standard Oil Company. Of course such a company owes a great deal to the genius of its organizers and to the energy of the American people, but it probably would not have attained its present dimensions if the peculiar conditions of petroleum did not put a special premium on large undertakings. For example the transportation of oil by rail is expensive in proportion to the value of the product, while pipe lines give oil almost the cheapest method of transportation. That is why there is one mile of pipe line for every 8 miles of railroad in the United States. In places like Mexico where the oil is shipped by sea and where lighterage would otherwise be necessary, the pipe lines are carried two or three miles into the ocean and attached to floating buoys. There the steamers may lie comfortably at anchor, paying no port dues, needing no pilots, and in little danger from collisions. They can be loaded cleanly, cheaply, and so rapidly that one great tanker the " Standard " has a record of taking on 118,000 barrels in less than 28 hours. Such conditions give a great advantage to the companies large enough to build their own transportation systems. In fact until the pipe lines were by law declared common carriers so that anyone had a right to ship oil through them, the company that owned the lines could force the well owners to sell at its own price, for with thousands of barrels of oil rushing to the surface daily, the owner of a gusher could not afford to wait in the hope of getting cheaper transportation.

The geographical or geological conditions which cause oil to gush out rapidly as soon as the reservoirs are tapped have had other interesting effects. For instance they have caused the oil companies to be peculiarly vigorous in searching for markets in order to save the oil that was being wasted. The Standard Oil Company in particular has pushed its sales in foreign lands. For example it has developed the 5-gallon tin can as an object of interest and value to buyers by stamping sacred animals on its sides. Thus the elephant in India, and the monkey in Tibet, for instance, make the cans symbols of good luck, so that in the Himalayan temples they are even considered fit to hold incense. Elsewhere they are used to store water, milk, clothes, and money, and even as bird cages. One effort of the oil men has been to fight local prejudices in unprogressive lands and substitute kerosene for the native vegetable oils as a means of lighting. In order to capture the market a small tin lamp with "trustworthy" on the side was put on the market at 7½ cents although it cost 11 cents to make and deliver. The first year 875,000 were sold and the second year two million. The extra kerosene sold because of the lamps far more than paid for the loss on the lamps themselves. These things illustrate not merely the alert methods in the oil industry, but the way in which peculiar geographical conditions cause peculiarities in business. Since oil is always in the stage of development, and since new wells are continually coming in with a rush, highly prompt and scientific methods are needed not only to cap the gushers and store the oil, but to get it onto the market as rapidly as possible, and to obtain a world-wide market so that the vast wastage may be prevented.

Coal and Iron as Examples of Permanent Mining.—As the foundation of other types of business no industry except agriculture is more important than permanent mining. Coal, as we have seen, is so vital to modern business that its probable exhaustion is one of the world's greatest economic problems. Even today the demand of the British coal miners for nationalization of the mines, the bitterness between France and Germany over the Saar coal basin, and the strikes in the American coal fields make coal the basis of some of the most perplexing social and political problems. Iron does not create quite such a serious problem, but its importance is so great that the price of pig iron or steel is one of the best indicators of the probable trend of business. One of the first signs that business is recovering from stagnation is increased orders for pig iron or steel, promptly followed by a rise in price. The reason is obvious: as soon as confidence is restored iron is needed to repair or replace wornout equipment and machinery. Again, one of the first signs, or as many people believe, one of the primary causes of hard times is lack of confidence among business men. Physical or mental depression makes them doubt whether large stocks of goods can be sold and promptly paid for. Hence, production is limited, and the factories and transportation systems stop renewing and replacing their equipment. Thus, the demand for iron is reduced, and the pig iron market gives a fairly accurate indication of how prices and business are likely to move.

Characteristics of Permanent Mining Communities.—Although permanent mining communities are found in all climates, and among all races, they have certain important characteristics in common. First, as a rule, they produce only a single product, or at most only two or three, and their prosperity fluctuates greatly according to the demand for that particular article. We have already seen how the seasonal fluctuations in the demand for coal work great hardship on the miners and the railroads. In the same way fluctuations in the iron market cause the amount of work in iron mines to vary. During the Great War the price of silver rose so high that silver mines that had been abandoned as unprofitable were reopened. A few years later when the price dropped from about $1.30 per ounce to less than half that figure, some of the mines had to close again.

Another characteristic of mining communities is their great dependence on the outside world. The majority of such communities are in regions where the rugged topography or the climatic extremes reduce agriculture to small proportions. Even in the coal fields of Pennsylvania the minor irregularities of the plateau make agriculture difficult; in the iron region of Lake Superior the land is very rocky; in Alaska most of the permanent gold mines, those depending on veins, are located where the summers are too cool and moist for most crops; and in Arizona and northern Mexico drought renders agriculture difficult. A manufacturing community usually makes at least a few things for local consumption, but in mining communities the final product can rarely be used at once. If the Minnesota iron miner wants a pick, he may buy one made of his own ore, but the ore has gone east to Pennsylvania to be smelted; as pig iron it has perhaps gone to Cleveland for manufacture, and as a finished product it returns to its source. Thus the demands of the permanent miner, more than those of almost any other person with an equal income, must be satisfied from a distance. Mining machinery is costly, and types like steam excavators and crushers require frequent renewal. Moreover, peculiar kinds of transportation facilities, such as elevators, chains of buckets, and ore cars are needed. Thus the mining community, with its valuable products as a basis of exchange, is one of the great stimulators of business.

Another feature of mining communities is their relative undesirability as places of residence. In general such towns contain a large number of ignorant laborers, often recent immigrants, for only such men will do the hard, heavy underground work. A few highly trained mechanics and superintendents are always necessary. Their number increases as the machinery becomes more complicated, but is rarely large enough to form a pleasant community which people deliberately choose as a home. There are few professional people, and few merchants, and as the merchants cater mainly to the immediate needs of the miners, the stores are generally poor. Moreover, the physical conditions are rarely pleasant. Even if the climate is favorable, great unseemly piles of debris from the mines and of slag from the smelters may injure the scenery, and often fill the air with dust. The " culm " heaps of Scranton and Wilkesbarre stand out in people's memories even though those places are among the pleasantest of mining towns. Sometimes the sulphur fumes escaping from the smelters kill the trees, as at Butte, Montana; elsewhere as in the Appalachian region the collapsing of the coal mines may cause the ground to cave in. On Jan. 13, 1922, twenty acres of land in the midst of Scranton caved in, dropping the houses of five city blocks down a number of feet. Again, transportation facilities are usually poor in mining regions. Not only are the mines apt to be located in rugged regions, but they are generally off the main lines, and the local railroads are poorly built because they are not expected to be permanent. The outgoing freight may be very bulky if ore is shipped out, while the incoming freight is of small proportions, thus adding to the difficulty and expense of transportation. In addition to all this the uncertainty as to how long the ore will hold out often makes people hesitate to improve their homes or their city. Such conditions hinder the progress of mining towns, keep the schools backward, and diminish the opportunities for recreation, art, music, and the other uplifting agencies. Nevertheless some mining towns make a valiant attempt to be clean, attractive, and progressive.

Permanent Iron Mining in the Lake Superior Region.—Let us briefly glance at permanent mining in three regions. We shall omit coal because that has already been considered. The great iron deposits south and west of Lake Superior are mined in preference to all others in the United States because the ore is of high grade and can be easily mined. Moreover, it can be cheaply transported by water almost to the coal in western Pennsylvania. The ore lies so near the surface and in such thick, soft, extensive layers that much of it can be dug by the open-pit method, which requires no timbering, hoisting, or ventilating. So cheap is this method that it pays to remove a hundred feet of soil and broken rock or about a ton for each ton of underlying ore. The whole town of Hibbing, Minnesota, with a population of about 10,000, was moved bodily in 1914 to get it off a body of ore.

The open-pit method makes transportation easy, for freight cars can run directly alongside the steam shovels and be loaded at the rate of two tons per scoop, or 5 minutes per car. The 50-ton steel ore-cars, with bottoms that open for dumping, are made up into trains a third of a mile long. From Hibbing and the neighboring towns the trains travel for about 80 miles down a gentle but almost steady grade to Duluth. As each train passes onto the high piers at the lake shore, it traverses scales which register the weight of each car. The ore is then dumped into huge pockets to await the arrival of an ore ship. When the ship is ready to be loaded, the ore passes from the pockets into spouts at the rate of 80 to 300 tons per minute. The combined advantages of good ore, easy mining, and easy transportation enable the Superior region to produce five-sixths of the ore of the United States.

When mining is carried on by the open-pit method it loses most of its unpleasant features. Like ordinary quarrying it is a healthful, outdoor occupation. The extensive use of complicated machinery demands a large proportion of highly skilled labor, and the fact that the iron is carried to the coal means that there are no dirty, smoky, odoriferous smelters or factories near the mines. It is fortunate that iron, the most useful of the metals, and aluminum, which bids fair to occupy second place, are the two where quarry methods and the extensive use of machinery enable the ores to be extracted most cleanly and healthfully. In such places higher standards of living can prevail than in the bituminous coal fields, for example: strikes are less frequent, for a dirty job helps to breed discontent, education is better cared for, and there is more prosperity, all of which helps business.

Permanent Mining of Precious Metals by Up-to-date and by Backward Methods.—Most gold and silver mines lie among the mountains far from the centers of civilization. Let us compare permanent mining where advanced methods are used as in the Alaska gold mines, and where primitive methods are used as in the silver mines of Mexico.

In Alaska, wherever the placer mines are exhausted and the prospecting and developmental stages have passed away, the methods of mining are usually so advanced that the work pays if gold the size of a pea can be extracted from a ton of ore. The Treadwell mine has yielded over sixty million dollars' worth of gold from ore running $2 to $3 per ton. In the Gastineau mine the ore contains only $1.50 per ton, but in 1916 the cost of mining was only 50 to 60 cents per ton, and the cost of milling 15 to 25 cents. Hydro-electric power raises the ore from the mines, dumps it on screens, crushes it, carries it to storage bins, and thence to successive steel rollers which crush it as fine as flour. Then shaking tables covered with water sort the dust so that the heavy gold falls and is carried to Wifley tables covered with mercury which forms an amalgam with the gold. Finally the amalgam is heated and the mercury vaporized, leaving the gold. Although four to ten thousand tons of ore are treated per day, geologists estimate that the mine will continue to produce for 75 or 100 years. Such mines, as well as the iron mines, illustrate the fact that except where the ores are very rich, permanent mining is profitable only if large companies can provide capital for expensive machines and for the complex transportation facilities which are a main factor in all large mining operations. Communities like those at many of the Alaska gold mines, however, have many of the disadvantages of mining towns which are still in the stage of development and prospecting. The climate of most of Alaska is so cold and the winters so long and dark that people are not tempted to live there permanently. The miners rarely bring their families; few stay unless their work demands it; and hence the mining communities have a temporary and unprogressive character which is bad for business.

Among unprogressive people like the Mexicans the lack of scientific methods prevents permanent mining except in rich, rotten, soft ores. In the "patio" or courtyard process, men, women, and boys break up the soft ore with hammers and sort out what looks good. Then the ore is crushed by a big stone like a thick millwheel set on edge and drawn by a mule. With such a crude process the returns are of course small, great amounts of metal are wasted not only because everything but the best ore is thrown away, but because even from the good ore only a part of the metal is extracted.

Mining is one of the industries that adds most to the business life of a country, and one in which scientific methods have been most fully applied so far as the extraction and smelting of ores is concerned. It still suffers, however, from serious disadvantages. The main disadvantage, corresponding to the lack of cooperation among ordinary farmers, is the rather unpleasant character of the work and of the communities, and the consequent low social and civic standards. What is most needed is the further application of scientific methods not only to the extraction of the ore, but to the life and work of the miners. Science has developed new uses for old ores, it has discovered how to utilize new ore, and how to mine low grade ores at a profit, and it has located many new bodies of ore and has invented new alloys which have the value of new metals. What is now needed is to make mining towns attractive and wholesome communities in which to live.

EXERCISES AND PROBLEMS

NOTE.—Part of these exercises may be left for Chapter XXIV

1. The relative mineral production of the countries of the world. From Table 25 prepare a list of minerals, and under each write (*a*) names of all countries producing at least one-tenth of each mineral, (*b*) amount of production in each country, and (*c*), total number of countries in which at least 1 per cent of the given mineral is produced.

Classify the minerals in two ways: (*A*) according to whether one, two, three, or more countries produce as much as 10 per cent; (*B*) according to the number of countries in which at least 1 per cent of the world's total supply is produced. Draw conclusions as to which minerals are the most widespread, which are most likely to cause international complications, and which are the ones that strong nations are most likely to wish to control in other countries.

2. From the first list prepared in Exercise 1, prepare another showing for each country the names of the minerals produced there in excess of 10 per cent of the world total. Rearrange this list by continents, putting the countries of each continent in order according to the number of minerals produced to the extent of 10 per cent. On a map of the world insert the names of the minerals in all countries where they are produced to the extent of 10 per cent. Make a list of all countries having a population of ten million or more (Table 1) and not appearing on your list. Draw conclusions as to the parts of the world where mineral wealth is most and least developed, and the causes of the difference. How far do you believe that the countries where much mineral wealth is produced are also the parts whose mineral resources are greatest?

3. Repeat Exercise 1, using states instead of countries (Table 26).

4. Repeat Exercise 2, using states instead of countries (Table 26). What incentive which impels countries to develop their own minerals rather than those of other regions, is lacking in the case of states? Why? Is this advantageous or harmful?

5. From Table 27, select the five states leading in mineral industries. What figures in the table determine your decision? In the selected states what are the other chief occupations and how do they compare in importance with one another and with mining (Table 8)? What physical characteristics have the five states in common? In what geographical conditions do they differ? What minerals plus what other conditions cause these states to rank so high in the mineral industries? How far are they the states where mining is relatively the most important occupation?

6. Construct a "Gold" map of the world. Place upon the map in graphic form all the information about gold in the tables at the back of the book. Compare various ways of presenting data of this kind and make the pictorial story as effective as possible.

7. Repeat Exercise 6, using some other mineral. Look up the mineral in reference books and write an account of its geographical distribution and its effect on industry and commerce.

8. From the Statistical Abstract of the United States or the Mineral Resources of the United States draw curves showing the production of petroleum in the U. S. during as long a period as possible. Draw similar curves for Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, Oklahoma, Kansas, Texas, and California. Study the curves and formulate some theory concerning the life of an oil well or an oil district. What predictions are possible concerning those districts whose curves are still rising?

9. In Table 25 arrange the countries of the world in three groups: (*A*) producing both iron and coal; (*B*) producing one but not the other; and (*C*) producing neither. Study the groups and try to determine how the progress of the various countries has been affected by their position in these groups.

CHAPTER XV

THE CHARACTER OF MANUFACTURING COMMUNITIES

The Three Stages of Manufacturing.—Manufacturing is sometimes called *secondary* production. It takes the materials derived from *primary* production,—from farming, mining, herding, lumbering, fishing, and hunting,—and converts them into new products. Secondary production falls into three stages: (1) *primitive* manufacturing, illustrated by an Indian of Guatemala who carves a handle for his big machete and then uses the completed tool to fashion a bowl from a gourd; (2) *simple* manufacturing, where local raw materials are converted into forms that can be conveniently shipped or kept without injury, as in the milling of wheat, the shaping of lumber, cotton ginning, ore smelting, and the preparation of raw sugar; and (3) *complex* manufacturing, in which the location of raw materials makes relatively little difference, since the value of the final product depends mainly upon the amount of labor which it requires, as in the making of locomotives, dyes, fine cloth, and high-grade chemicals.

The three stages are well illustrated by shoemaking. Suppose a Mexican herdsman kills a steer and tans the hide at home. Then with no tools except a knife, awl, and needle he shapes the leather into a rough pair of soft-soled shoes. That is primitive manufacturing. But suppose the hide of a steer is shipped along with many others to a local tannery. It is there treated according to the methods of simple manufacturing. First it is softened in lime pits. This makes it ready for a machine which scrapes off the hair, the epidermis, and the fleshy inner part of the skin. Then the lime is removed with acid, and the hide is scraped and pressed to remove the fatty parts. Next the hides are washed and then put in tanning pits where they gradually pass from pits containing weak solutions to those where the solution is strong. After weeks or months in the pits the hides are cleansed, bleached, scoured, and oiled or greased. The whole process of tanning takes from three months with poor leather to eight or ten with the highest grades. The tannery is a good example of simple manufacturing for two reasons: First, although it employs machinery and puts the goods through a number of processes, the final product is not very different from the original raw material. The chief difference is that it has been made more durable, usable, and easy to ship. Second, the tanning industry depends largely on local raw materials or else is located where raw hides can reach it at relatively slight expense.

Let us carry the hides to a shoe factory and see what happens to them in a complex industry. Here the workmen are largely specialists. The ordinary shoe consists of eight or ten pieces of leather in addition to the lining, eyelets, lacings, nails, pegs, and perhaps certain parts made of cotton cloth, felt, paper, or rubber. Each part is made by a different workman using a different type of machine. Then the parts go to another set of operatives and are put together with the help of special sewing machines of various kinds according to the parts that are to be united. Other machines drive nails, insert the eyelets, smooth and polish the soles and heels, and perform a score of other operations. When the shoe is finished it not only is wholly different from the original hide in appearance, but it contains materials derived from many different sources. Moreover, a large part of its value is due to the work that has been put into it rather than to the raw materials. The shoes which are the product of complex manufacturing are very different from those which the Indian turns out as the result of his primitive manufacturing.

Primitive Manufacturing.—Primitive manufacturing is almost the only kind in many tropical regions including a large part of Africa and South America, except where the white man has introduced something else. It also is the chief kind of manufacturing throughout the greater part of the continent of Asia.

In some form, however, primitive manufacturing prevails almost everywhere. This is an advantage, for although it is bad for a country to have no other form of manufacturing, it is a detriment if household industries, which are an outgrowth of the primitive type, are not highly developed. Even in the most civilized countries it is a good thing for the women to make clothes, put up preserves, and prepare beautiful lace or pottery. It is equally good for men to be able to make shelves for the pantry, or for the farmer to know how to mend his wagon or cobble his own shoes in winter when there is not much other work. Where people have considerable native ability their primitive manufactures often possess a high esthetic quality as in the wood carving and toys of the Swiss, the lace of Italy and Ireland, the shawls of Kashmir, the quilts of the Kentucky mountains, and the rugs of Turkey and Persia. Such articles, which often preserve old and attractive designs, are the only primitive manufactures which play any appreciable part in the general business of the world. Their persistent manufacture is generally due to the fact that they depend on some hand process which no machine can yet imitate satisfactorily. Otherwise, except in regions where transportation is unusually difficult as in Tibet, or where the people are so few and poor that it is not worth while to import manufactured goods from a distance, as among the Eskimos, the products of primitive manufacturing are being rapidly superseded by cheap substitutes manufactured in more progressive countries. For instance, the cheap cotton cloth in which the majority of people in China, India, and Africa are clothed is largely produced by English mills.

Turkish rugs are a good example of a primitive manufacturing industry which still thrives. The raw materials are produced close at hand, the wool coming from the flocks of the nomads and the dyes from plants which usually grow locally. Sometimes a good vegetable dye requires ten or twelve processes lasting nearly a year. The fact that aniline dyes are now being used illustrates how an artistic primitive industry tends to break down and deteriorate under the competition of manufactured goods from more progressive countries. In making a Turkish rug no machinery beyond what almost anyone can construct is needed. The warp threads are merely stretched parallel to one another so that they can be wound up on a round beam, the woof threads are then passed through the warp, a knot is tied; and the thread cut. The work is extremely slow, for a clever girl, working eight hours a day and tying three knots a minute would need about four years to make a rug seven by four feet with twenty knots per inch. But such a rug involves no heavy outlay of capital and so no financial problem. It commonly is used by its maker and hence involves no marketing problem.

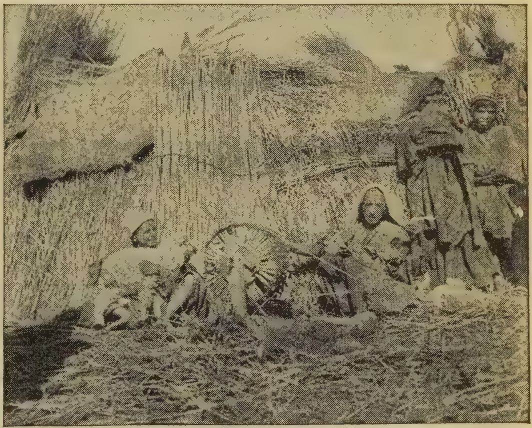


FIG. 52.—Spinning Wool in Eastern Persia.

This primitive method of manufacture is a little more advanced than the method of spinning by hand which prevails in large parts of the world.

If the rug gets into the current of the world's business, it is almost invariably because progressive people from other countries come to the place where it is made and insist on buying. Often the maker has no desire to sell, or else sells merely from the compulsion of poverty. In this fact lies one of the chief differences between primitive and complex manufacturing. The people who carry on complex manufacturing not only make goods to sell, but go out and create a market for them among people of every degree of progress. In addition to manufacturing and selling they not only buy the goods that are offered to them, but they almost compel less active people to prepare the raw materials and the primitive or simple manufactures which are used as raw materials for more highly manufactured kinds. In other words the push and energy come largely from a few progressive regions. For instance, the rug industry has been much stimulated in Persia and Turkey by American buyers; the primitive home cotton industry of India has risen to the status of a simple factory industry under the influence of Englishmen. Even in our own southern states the cotton factories of the Carolinas and Georgia and the iron factories of Alabama are largely owned and run by northerners.

Simple Manufacturing.—The second stage of manufacturing is located in places where the people have more push and inventiveness than do those who are content with primitive manufacturing, or else where other races bring in the necessary initiative. Moreover, simple manufacturing prevails in regions where people have more of a given raw material than they need, and where they can sell it more profitably if they change its form before sending it out. For example, the presence of a specially abrasive sandstone called Berea grit causes northern Ohio to make 70 per cent of all the grindstones in the United States. In many cases such simple manufacturing is an incidental industry. For example, the canning industry arose largely because many raisers of fruit and vegetables had a surplus which they could not sell locally and which was being wasted. Part of this the farmers' wives began

Courtesy of Asia Magazine.

FIG. 53.—Japanese Toy Maker.

One of the many simple but artistic industries of Japan.

to can or dry for their own use; then they sold their garden and orchard products to neighbors in the villages who had taken up the work of canning, and finally to the factories which were established in the locality. In the beginning such canning industries paid little attention to climatic optima, since the people manufactured only what surplus there happened to be, but as the business proved profitable people worked to create a surplus. Then the places where the climate is most favorable to a given product took the lead, for there the surplus is largest and it is easy to create a still larger surplus. Hence, the region around Baltimore has come to be a leader in canning tomatoes, southern Maine for sweet corn, California for peaches, Hawaii for pineapples, and the Columbia River and Alaska for salmon. Usually a simple industry grows until it exhausts its supply of local raw materials. If it is situated in a region where the people are especially energetic and ingenious, it tries to get materials from a wider area and may become complex. For example, the brass and bronze industry of Connecticut began with the use of copper kettles discarded in colonial kitchens a century or two ago, but it gradually grew until it became a highly complex industry bringing copper and tin from long distances and manufacturing over 40 per cent of the brass and bronze of the United States.

Summary of Simple Manufacturing.—Taken as a whole the simple industries may be thus summarized: They use few raw materials, most of which are of local origin and have not passed through a previous process of manufacturing. These raw materials are usually manufactured near the source of production because they are either bulky or perishable in the raw state. If they are perishable, the industry may be highly seasonal, demanding many workers at one time, for example, at the harvest season, and few at others. Such temporary employment plus the absence of complex machinery encourages unskilled labor. This tends to retard regions of simple manufacturing for it tends to prevent the growth of any large body of skilled workers who are usually more eager than the unskilled workers to advance the interests of the community.

The reduction of bulky raw materials to the manufactured condition usually gives some waste products. A flour mill produces bran, a corn canning factory has husks and cobs which were formerly wasted or fed to the pigs but are now beginning to be used for alcohol and other purposes, and a blast furnace produces much slag which is a source of excellent fertilizer. Where attention is paid to these, the profits of simple manufacturing are often materially increased. For this reason more and more use is being made of such articles as sawdust, slab wood, and fish bones. In a large slaughter house every bit of fat is tried out from the scraps of edible meat that cling to the bones. The inedible parts and the bones that are not wanted for buttons or glue were formerly made into fertilizer but now are completely disintegrated in superheated steam and made into cakes that are very fattening for cattle. The utilization of by-products is one of the chief ways in which simple industries gradually become complex.

In general, the scale of production in typical simple industries is relatively small and the financing requires only sums that can be raised locally. Sometimes, however, the scale of production is enormous as in the great meat packing establishments and the petroleum industry, but in both these cases the use of by-products is so extensive that the industries are really complex. The selling problem is also relatively simple, for aside from the foodstuffs the products of simple manufacturing rarely go to the ultimate consumer, that is, to the individuals or businesses where they are finally worn out or destroyed. Instead they usually go to other lines of business where they are changed into new forms as when wood is used in houses, iron in making machinery, and linseed oil in making paint. Under such circumstances the market conditions in simple manufacturing depend largely on the people from regions of complex industries who go out to buy half-manufactured raw materials. This is a disadvantage to the communities where simple industries prevail because it prevents them from absorbing into their businesses the wideawake type of people who naturally take up the complicated problems of salesmanship.

How the Complexity of the Highest Type of Manufacturing Limits its Geographical Distribution.—*A. Materials and Equipment.*—In the rest of this chapter our aim will be to examine some of the conditions which make the highest type of manufacturing so complex that it has thus far succeeded only among people of unusual alertness and capacity. One of the most prominent of the characteristics of complex manufacturing is the great number of materials required. For example, compare the number of raw materials used by a shoe manufacturer with those of the cattleman who raises the hides which form the manufacturer's chief raw material. The cattleman may need some corn from a distance in addition to what he raised himself. He also needs salt and tar, but only in small quantities. The equipment of saddles, agricultural implements, branding irons, and so forth, which must be purchased from a distance, is relatively small. So is the supply of clothing for the family and that part of the food which is not raised locally. The cattleman's few buildings are simple in construction and are made almost entirely of whatever kind of wood can be procured most cheaply. On the other hand, the shoe manufacturer may require not only leather, but many

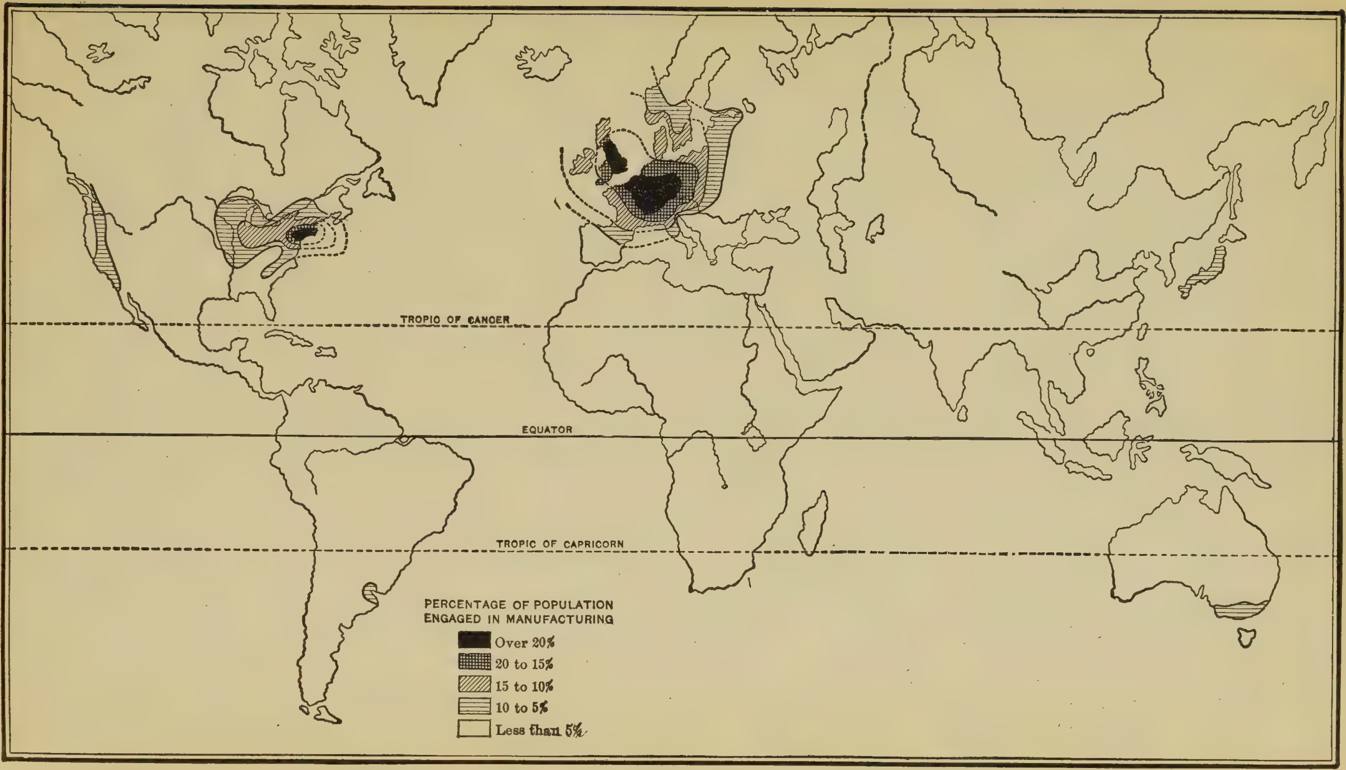


FIG. 54.—Percentage of Population Engaged in Manufacturing.

products of simple manufacturing including cotton thread from the South, maple lasts from New England, nails and eyelets from iron foundries in Pennsylvania, linen thread grown perhaps in Russia and manufactured in England, wax from palm trees in Central or South America, and even oil extracted from bananas raised within the tropics. His buildings take the form of an extensive plant of brick, glass, cement, steel and wood. His tools in large part are highly complicated machines, some fitted with saws having teeth of English steel, others competent to measure a hide and show on an indicator just how many square feet it contains. In addition to all this, a shoe manufacturing community must depend on other people not only for clothing and shelter, but, also for its food, except perhaps a few vegetables.

B. Dependence of Manufacturing on Transportation.—Few other occupations demand such extensive transportation and employ such diverse methods as does complex manufacturing. In order to make the numerous and complicated exchanges which finally enable the manufacturer to get raw materials in place of his finished products, the component parts of a single article may make a score or a hundred journeys by almost every mode of conveyance. Call to mind the steamships, railways, camels, auto trucks, and other means of transportation used in bringing the raw materials mentioned in connection with shoemaking. Among primary producers, the dairyman and market gardener perhaps depend more immediately than the manufacturer upon steady local transportation, especially at certain seasons, but their products usually move relatively short distances and make only a few trips.

C. Dependence of Manufacturing upon the Labor Supply.—The labor supply for complex manufacturing presents a difficult problem. This is partly because of the number of people employed. In the United States the number of wage earners reported as engaged in complex manufacturing in 1914 was about 4,775,000 compared with 1,865,000 in simple manufacturing and 2,664,000 employed on farms other than those of their own families. Still more important is the fact that only about 3 per cent of the persons engaged in manufacturing are in any sense owners and only another 11 per cent belong to the office force, whereas about 50 per cent of the persons engaged in agriculture either own their farms or at least rent them and are their own managers, and another 27 per cent belong to the families of the farmers. Although the farmer is confronted by a grave labor problem because of the seasonal character of his occupation, he and his family usually do so large a share of the farm work that the failure of the outside labor supply does not ruin him, unless his farm is large. The manufacturer must hire all his labor, and the very time when he needs help most is the time when his men are most likely to strike for higher wages.

Another difficulty of the labor situation in manufacturing communities is the complexity of the work. Where the cattle raiser, for example, requires only a few men who can easily be trained, the shoe manufacturer requires many kinds of operatives, some of whom need long training. Of course it is easy to get untrained girls who can care for "crippled" shoes, but it is hard to find men so skilled that with the naked eye they can judge the shape of heels held against rapidly revolving knives. These men make high wages even though they are fined if the fraction of a moment's delay gouges a heel too deep and ruins its shape. So varied and large a supply of labor can be procured only in regions with a fairly dense population, so that the higher types of manufacturing, do not thrive except where the population is dense.

The labor conditions also cause manufacturing regions to be centers of a grave series of social problems such as unemployment, poor relief, strikes, socialism, and child labor. Where the work is so specialized the failure of any one group may throw the whole factory out of work. Moreover, one industry depends so closely on another that a strike or a shutdown in the steel works, for instance, may hold up the automobile makers, the railway repairers, the makers of cotton machinery, and many other workers. Again, factory work is so mechanical, so minutely subdivided, and demands so little initiative that it is monotonous and disagreeable. Moreover, while the owners of a factory are frequently at the mercy of the operatives, the operatives are also at the mercy either of the owners or of the unions. Such conditions breed discontent. The density of the population makes it easy for agitators to make themselves heard, so that discontent spreads and there is constant social ferment. Permanent success in complex manufacturing demands that the community shall have enough organizing ability and determination to face and solve a vast series of such problems which show no tendency to become simpler, but rather to become more complex. Only a few parts of the world have yet shown this ability.

D. Geographical Limitations Due to the Financial Problems of Manufacturing.—Another condition which has an important bearing on the location of manufacturing industries is the large amount of capital required and the difficulty of making wise purchases of distant raw materials and extensive sales of the finished product. In the United States the capital invested in manufacturing in 1914 amounted to $23,000,000,000. This sum, large as it is, is scarcely half the value of all farm property including land, buildings, implements, machinery, and live stock. Nevertheless, it represents a far greater financial problem, for the farm values are largely the result of gradual growth; while the capital invested in manufacturing has in most cases been deliberately set aside as the result of savings, and has been invested in relatively large blocks at a single time. Hence, manufacturing can prosper only when it can draw on a large surplus of savings. But the people who have the ability and determination to lay up much capital are limited to a few areas, chiefly in Europe and the United States, and many of them want to invest their capital near home. Of course many people invest heavily in remote lands, but it is far easier to get capital for a promising enterprise that is directly under the eye of the investor and in the management of which he has a share, than to get it for one that is far away and whose managers he does not know. This fact is a powerful aid in establishing industries in a state like Massachusetts where 67 per cent of the inhabitants had savings bank accounts in 1920, rather than in Indiana where only 1 per cent have such accounts, or New Mexico where there are practically none.

One reason why investors like to place their money in manufacturing enterprises near home is that this increases the value of their other business. In proportion to the capital, the expenditures in manufacturing are far greater than in agriculture because all the labor must be hired, and all raw materials must be purchased. In 1919 the wages and salaries of manufacturing establishments in the United States amounted to the huge sum of $13,439,000,000, the cost of raw materials to $37,380,100,000, and interest at 6 per cent on the invested capital, to $2,680,000,000. Such expenditures stimulate the growth of the regions where they are made and thus tend to produce more wealth, more savings, and new lines of business. This again leads to further concentration of manufacturing in the places where it is once established. The spending of these great sums of money also causes the regions of complex manufacturing constantly to draw to themselves capable men from other regions. It takes men of ability not only to run the factories but to handle the intricate problems of cost accounting, and to judge just where, when, and of what quality and at what price to purchase raw materials.

E. The Marketing Problem of Complex Manufacturing.—So far as marketing is concerned there is an important difference between unmanufactured or semi-manufactured articles like wood or coal and highly manufactured goods like typewriters. Almost everyone must have wood and coal, and if these commodities were not offered in the market people would promptly go in search of them. Their quality cannot be greatly altered no matter how keen the competition, and they cannot be driven out of the market except by some revolutionary change. Hence, the problem of marketing them is relatively easy, we rarely see them advertised, and they do not need a large force of traveling salesmen, or of experts in the home office devising means of bringing the product before the public. Therefore they can be profitably produced in regions where the degree of business activity is relatively slight.

On the other hand the use of manufactured articles may change at any moment almost without warning. A new law may render a given type of automobile headlight worthless; a new fashion may make it necessary to dispose of a large lot of dresses at a merely nominal price; or a new invention may make certain kinds of cotton machinery worth no more than scrap iron. Moreover, the manufacturer is vastly more dependent on his sales than is the farmer. If the farmer cannot sell his potatoes or milk, he at least has something on which he and his family can live. But if the manufacturer of screws cannot sell his product at a price sufficient to pay for the cost of manufacture, he and his employees have no means of getting a living. Thus success in manufacturing demands the presence of men with high ability in salesmanship.

F. The Inventiveness Demanded by Manufacturing.—Even the simplest kinds of manufacturing demand a considerable degree of inventiveness. As industries become more complex and competition keener, the necessity of ingenuity and inventiveness become greater. At the same time the possible rewards of a new invention increase, for the extent to which a new product can be marketed increases steadily with the degree to which people become accustomed to innovations. This is in harmony with the extraordinary way in which the number of patents issued by the United States Patent Office has increased. According to the following table, the rate is about two and a half times as fast as that of the population.

PATENTS ISSUED ANNUALLY IN THE UNITED STATES

1860	4,778	1900	26,499
1870	13,333	1910	35,930
1880	13,947	1920	39,882
1890	26,292		

These figures illustrate the highly important fact that continued success in the higher types of manufacturing demands a constant stream of new inventions. The leading place is bound to go to those regions where the people have the ability, energy, leisure, and capital to make and apply the greatest number of successful inventions. Take a city like Waterbury, Connecticut, for example. That one city with almost no natural resources, with far less waterpower than it needs, and little except rugged hills for farmland round about it, has been the home of hundreds of inventions. One of the machines credited to Waterbury makes hair springs so small and delicate that a pound is worth nearly $50,000. Another machine carries on a hundred forty-one operations automatically, and still another turns out screws so tiny that thousands are needed to fill a thimble.

The Geographic Conditions of Manufacturing.—From the foregoing discussion it is evident that while simple forms of manufacturing are possible wherever man lives, the evolution of manufacturing puts stricter and stricter limits on the regions where the highest types can be practiced. When wool and cotton thread were spun only by hand, and when the products were woven into cloth by the simple process of passing the woof threads back and forth across the warp by hand, the quality of the cloth made in the various parts of the world was almost the same. Today, when the finest cloths demand extremely complex machinery and great skill in organizing and financing the industry, the higher grades of textiles are manufactured only in a very limited area, chiefly in the northeastern United States, Great Britain, and a small part of continental Europe including Belgium, northern France, part of Germany, and Switzerland, together with a few neighboring regions such as Sweden and southeastern Canada, and one or two other areas, including the Pacific coast of the United States, Japan, Australia, and New Zealand. In the same way, although pig iron and the coarser steel products are being manufactured more widely now than ever before, the making of high grades of steel goods, such as complex machines, is strictly limited to the areas just mentioned. The most notable fact is that the complex type of manufacturing flourishes only (1) where natural selection and migration have given the inhabitants a racial inheritance of high mental activity and capacity; (2) where the present climate is so healthful and stimulating that people possess great energy and perseverance; and (3) where a certain degree of skill has been acquired and each generation is able to teach its successor. By improving natural conditions and selecting and training the right kind of people, the areas where the highest grades of manufacturing are possible may perhaps be greatly extended, but at present they are strictly limited.

EXERCISES AND PROBLEMS

1. Study the relation of large cities in the United States to manufacturing. From Table 8 E pick out the 10 states with the largest percentage of the population engaged in manufacturing and the 10 with the smallest. In Table 6 count the number of cities of over 100,000 population located in each of these groups of states and in all the

rest of the states. How many of the 10 highest states in Table 8 E are also among the first 10 in Table 2 E? What do you conclude as to the relation between manufacturing and the size and number of cities?

2. Study the racial composition of the manufacturing communities of the U. S. From Table 2 G, H, and I, and all columns of Table 3 let different members of the class prepare averages showing the percentage of persons of each race in the 10 states which have the largest percentage of the population engaged in manufacturing (see Exercise 1). Compare the averages with the corresponding averages in (*A*) and 10 states where colored people are most numerous, and (*B*) the 10 states from Iowa and Minnesota westward to the Pacific. What do you conclude as to the races employed in the unskilled labor of manufacturing regions?

3. Study the three stages of manufacturing in some industry other than shoemaking. Choose an industry from your own town. From books of reference and from observation prepare an account of the characteristics of the community and the kinds of manufacturing processes in a typical community where the material of your industry is subjected to each of the three stages of manufacturing. Describe in detail the manufacturing processes in each case. Give the geographical and economic reasons for the distribution of the three stages of manufacturing.

4. Explain why complex selling systems are an almost inevitable result of complex manufacturing and why they penetrate into the regions of simple and primitive manufacturing.

5. Study one of the following simple industries in its relation to by-products: (*A*) Manufacture of kerosene, (*B*) slaughtering, (*C*) manufacture of gas, (*D*) saw mills, (*E*) cotton ginning. Use encyclopedias and census tables and determine the relative importance of the by-products and the original product, both in value and in number of persons employed.

6. Explain the political relations between manufacturing and (*A*) immigration, (*B*) tariff, and (*C*) ship subsidies. Explain why the attitude of manufacturing communities on these subjects is likely to be different from that of agricultural communities. From the tables in the World Almanac determine the percentage of votes cast for a presidential candidate standing for a high tariff compared with the votes for his low tariff opponent at any election where the tariff issue was of chief importance, and make an isopleth map. Or find the individual votes of the Representatives at Washington on some recent bills and determine what percentage of the representatives of each state voted for restricted immigration, a high tariff, or ship subsidies, and make an isopleth map. What relation can you see between your map and the types of communities in various parts of the country?

7. Compare the map of manufacturing (Fig. 82) with that of climatic energy (Fig. 23). From what is said in this chapter about the effect of climate on manufacturing and from your own knowledge explain the resemblances and especially the differences of the two maps. What non-climatic factors, geographical and otherwise, are especially important in determining the regions where the most manufacturing is done?

8. Suppose that three men are of exactly equal ability. One lives in the rugged part of Kentucky where transportation is so difficult that people often fashion their own tools; the second in a small town in North Carolina where he works in a cotton mill; and the third works in a watch factory in a Connecticut brass town. As the result of occupation alone what are the chances of mental development in each case? How far and in what way would mental development in each case be influenced by factors outside the man's immediate job, but depending on the degree of development of manufacturing?

CHAPTER XVI

TYPICAL COMMERCIAL CENTERS

Types of Commercial Centers.—(1) *Primitive Centers.*—The commercial center is mainly engaged in the exchange of products. Such centers exist in every part of the inhabited world, but differ greatly according to geographical conditions. In places like the Amazon Basin, where the damp, steady heat keeps people backward, the savages gather at recognized places at special seasons to exchange their slight surplus for knives, beads, or cloth. In many semi-arid regions such as central Anatolia and parts of Turkestan, where the population is sparse and often semi-nomadic, the commercial center takes the form of a bazar. An oriental bazar is a sort of fair held perhaps once a week either out in the fields or in an open square in a town. There the people from the surrounding region gather to buy and sell. The region from which they bring goods is called the hinterland of the bazar town. In one form or another such bazars or open-air markets are very widely spread in almost all regions where the absence of rain for long seasons makes them possible and where the population is so sparse that there is not business enough to warrant many permanent shops or stores. In the most primitive kind of bazar few who take part are professional merchants or manufacturers. Each family of peasants or nomadic herders brings food or primitive manufactured articles of its own make, and sells or perhaps barters them for something produced by other families.

In slightly more complex communities this simple method gives way to a system where certain men, usually with more than the average energy, ambition, and ability, act as merchants. They not only buy goods from the frequenters of the market, but make purchases farther afield and thereby expand the town's hinterland. Other men of similar energy, ambition, and ability, but with tastes that tend toward mechanical work and invention, find that by devoting all their time to manufacturing they can make a better living than by agriculture or herding. In that case it pays to live at the market town, for there they are easily able to buy the food that is brought from the hinterland and can sell their primitive manufactures without being forced to transport them.

Moreover, if their wares acquire a reputation, merchants from other centers can find them in the market town, but might not find them elsewhere. Thus a commercial center becomes also a manufacturing center even while still primitive. Hundreds of towns in China, India, and Russia, are of this type.

(2) *The Simple Commercial City.*—At a later stage of development the market town naturally engages in more complex business transactions, and its hinterland is correspondingly enlarged. Occasionally in backward regions, such a city may be almost purely commercial. Para and Iquique are examples. They have practically no business other than the outward shipment of the products of the tropical forests and of the nitrate mines respectively, and the inward shipment of food and of such manufactured goods as are needed by the sparse population of the interior. Oftener the raw materials produced in the neighborhood of a commercial city give rise to simple manufacturing, such as the tin smelting and pineapple canning of Singapore. Such cities, however, still remain predominantly commercial, for their problems are those of shipment and trade rather than of manufacturing and labor. They are found in all parts of the world that have passed beyond the stage of barbarism, especially on the seacoasts. In fact simple commercial cities have been established by people of European descent even on the coasts of the most backward regions, as at Georgetown, Paramaribo, and Cayenne in the Guianas. In more advanced regions some simple commercial cities, such as Rio de Janeiro, are of great size and importance. Hong Kong is an especially good example, for it assists in the trade of four continents.

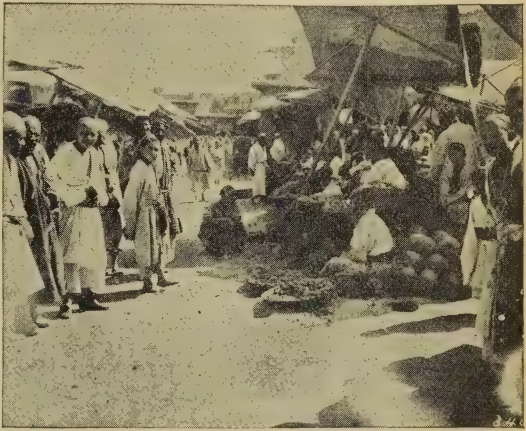
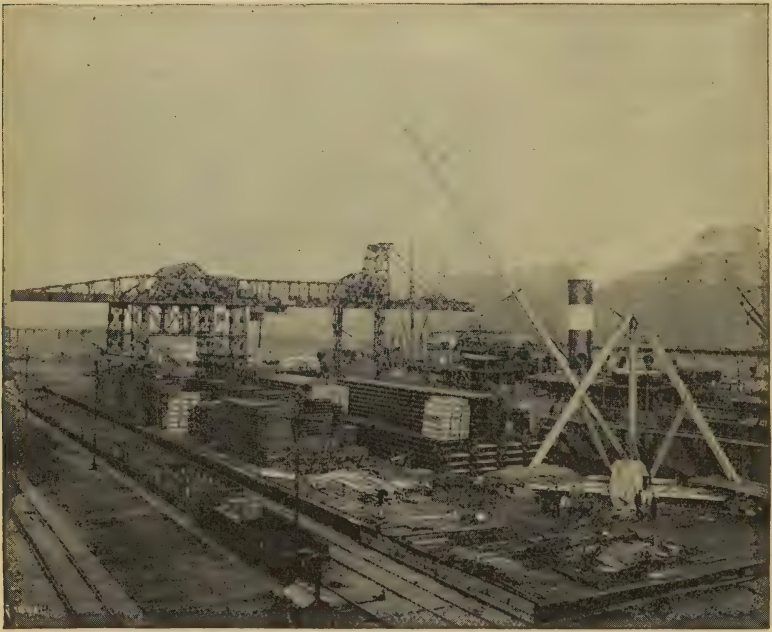


Fig. 55.—A Commercial Center at Kashgar, Central Asia.

3. *The Complex Commercial City.*—The highest type of commercial community is extremely complex because it carries on not only commerce but also complex manufacturing. This is attracted to the commercial cities by the facilities for transportation, the easy contact

with people to whom goods can be sold, the dense population from which a labor supply can be drawn, and the ease with which capital can be procured from the surplus arising from commerce as well as from other lines of business. Practically every such city is engaged in buying and selling articles which it neither uses nor produces, but which are produced or used by its immediate hinterland. In addition to this many commercial cities located on seacoasts serve as entrepôts, that is, they bring products from many regions, chiefly across the water, and sell them not merely as imports but for re-export. London, for instance, has a great reputation for colonial and tropical products such as hemp, wool, and spices. It monopolizes the transportation routes to many regions where these products are raised, so that it is often easier for other cities to buy them from London than to get them direct, even though the direct route may be shorter than via London. To stand their roundabout journey the goods must be non-perishable and of high value in proportion to their bulk. Antwerp and the Dutch



Courtesy, Seattle Chamber of Commerce.

Fig. 56.—Municipal Docks at Seattle.

This pier, when built, exceeded any other in area. It has five miles of railroad tracks, and ten large ocean vessels can be accommodated at once.

cities also have a large entrepôt trade, the remnant of the commercial power once held by the Dutch East India Company.

Complex Commercial Cities as Centers of Exchange.—The most highly developed commercial cities, especially London and New York, carry the entrepôt trade one step farther by making the transactions without handling the actual goods. Thus a shipment of cotton direct from New Orleans to Yokohama may be the result of a business transaction by a Wall Street broker. Such exchange cities grow because a commercial center tends to become a financial center. It gathers a surplus for investment not only from its own business, but from the fact that its banks are larger and stronger than those of outlying regions and so draw funds from them. Such financial service is of great value. (1) It builds up trade in places where confidence is not well established. New York can act as a pioneer in a great many enterprises where cities with smaller resources would be unwise to venture. (2) It regulates prices by adjusting the supply and demand over large areas. It is a great benefit to business that the prices established in the Chicago Corn Exchange should largely control the variations in the price of corn in most of the United States. The Exchange, which is merely an organization of the larger dealers in corn, looks over the whole situation as to the supply of corn on hand, the prospects of a good crop, the supply in one region or country compared with another, the present rate of consumption, and the factors which control consumption, including tariffs, war, famine, the size of other crops, and the number of pigs and cattle that must be fed. If each producer had to make his own bargain without knowledge of the conditions which govern his product in other places, the resulting confusion would resemble that which would prevail if each passenger on a railroad train had to make a separate bargain with the conductor as to how much fare he should pay. The prices of all sorts of commodities must vary from month to month and even from day to day, but it is vastly easier to have these variations depend on a single organization whose acts are made known everywhere than to have them depend on hundreds of thousands of individual bargains.

(3) A third advantage of having the great commercial cities serve as financial centers is that it increases the circle of customers available to the local producer. If each producer, especially each producer of raw materials and food, were to rely on his own efforts, his sales would have to be limited to the small group of buyers immediately surrounding him. Through the great exchanges in the big cities, however, the local producer is brought into contact with buyers all over the world.

The business of looking after the world's exchange of products is so great that New York alone has the following exchanges:

Coffee and Sugar Exchange
Consolidated Stock Exchange
Cotton Exchange
Cotton and Grain (American) Exchange
Crockery Board of Trade
Fire Insurance Exchange
Fruit Exchange
Dried Fruit Exchange
Iron and Steel Board of Trade
Jewelers' Board of Trade
Maritime Exchange
Mercantile Exchange
Metal Exchange
Produce Exchange
Real Estate Exchange
Stock Exchange

The most important of these is the Stock Exchange. The bonds sold there in 1920 had a par value of about $3,955,036,900, while the shares of stock numbered 223,931,350 that year and 312,875,250 the year before. These two kinds of securities represented over seven hundred and twenty different types. They included simple industries like the making of linseed oil and ice, mining industries of many sorts, complex industries like the making of electrical apparatus and pneumatic tools, and also railways, steamship lines, public utilities, and commercial enterprises such as chains of stores. To many people the stock exchange means merely a place where fortunes are made and lost, but really it has a far greater function. Not only does it enable people to know what possibilities of investment are open and how they are generally judged as to soundness, but it enables people to invest in new enterprises. Not that the new enterprises are listed on the stock exchange, but if a person has investments in marketable securities the stock exchange makes it possible for him to sell them at once, while if he were limited to the few buyers with whom he and his agents are personally in contact, it might take years to dispose of them. Thus the person who wants to invest in well-known securities can do so, while the one who wishes to give up the known securities and put his money into new ventures also finds the stock exchange convenient.

In addition to the exchanges a great commercial center has many other complicated means of carrying on the world's business. In New York these include a clearing house where checks, notes, and other forms of commercial paper pour in at the rate of seven or eight hundred million dollars' worth per day, or over two hundred billion in a year. They are sorted out and credited to the various member banks so that each one's indebtedness to all other members is balanced against the sums due it from all other banks, and the whole score is wiped off with almost no exchange of actual cash. Other factors in promoting exchange in New York are forty-nine foreign consuls and their staffs, thirteen railroad terminals into which pours the traffic from 21,000 miles of railroad, 91 steamer lines (1914) including 15 domestic lines to Long Island Sound and New England, 12 to the Atlantic and Gulf coast south of New York, and four to the Pacific coast of the United States.

The Attraction of Commercial Centers.—All these facilities, together with the telephone, telegraph, and cable lines which go with them, and the canal boats, trolley lines, and automobiles which aid in transportation, combine with the commercial and manufacturing enterprises in demanding a vast number of highly competent workers. Hence, a commercial center attracts many of the brighter, stronger young people. For that reason it tends to become a center of education, art, literature, and philanthropy. If it is also a seat of government, it possesses practically all the important means of attracting more than its share of the best brains of a country. Such conditions, quite as much as mere size and wealth, are the reasons why London, New York, Chicago, Paris, Berlin, and Tokio have an overwhelming influence in shaping the world's ideas and destiny. In the United States almost every city of over 200,000 people is an important commercial as well as manufacturing center, and in most cases commerce does as much or more than manufacturing to give the city its tone.

The Geographic Factors which Determine the Location of Commercial Centers.—In discussing the location of commercial centers let us first consider their general distribution throughout the world, and second their distribution in respect to local conditions. The general distribution of the three types of commercial centers, primitive, simple, and complex, is almost the same as that of the corresponding types of manufacturing communities. It is illustrated by the map of civilization, Fig. 25. Only in the regions of " very high " civilization do we find the highly complex type of commercial center, for only there do race, health, and historical development produce not only extremely active trade, and the most complex kind of manufacturing, but great accumulations of capital, the power to control large enterprises in other parts of the world, and the qualities which make a financial as well as a commercial and manufacturing center. How much these conditions have to do with the growth of large cities may be judged from the fact that of the world's 90 largest cities 47, or more than half, are located in the small dark areas of Fig. 25 where conditions of the greatest progress and energy cause almost every great city to combine complex manufacturing, commerce, and finance. Of the remaining cities 18 are located in regions of high civilization, the second grade in Fig. 25, and have a large amount of simple manufacturing and some financial importance, and 20 are located in the enormously populous areas of "medium" civilization where the inhabitants are progressive enough to have at least a moderate amount of simple manufacturing. This leaves only 5 great cities in the vast regions of low civilization, and none in those that are very low.

The Character of the Hinterland.—Having grouped the commercial centers according to their relation to civilization in general and manufacturing in particular, we find that the next factor in determining their character and size is the nature of their hinterlands. The hinterland proper is the immediate country upon which the city depends for existence, and is distinct from the more distant regions with which the city is in intimate connection. It is the region whose surplus products the city disposes of and whose demands it tries to supply; the more distant regions are those to which the city reaches out in order to find a market for its hinterland's surplus and to obtain the products which its hinterland does not produce. The commercial city is like a giant sitting at the gateway of his estate. With one hand he sweeps up the products which the people of his hinterland prepare; with the other he reaches far out to other people, strangers perhaps, and offers his people's products in exchange for something which he can hand back to his own subjects. Kansas City, for example, receives corn, wheat, cattle, and other agricultural produce from its hinterland, which lies mainly to the west of it. It sells its goods largely in the manufacturing cities of the East and even in Europe where Kansas beef, pork, and flour feed the workers who make machinery, cloth, railway cars, and articles of adornment. The hinterlands of cities may overlap, for example that of St. Louis overlaps and partially includes that of Kansas City, for many of the goods that are shipped to or from the latter are bought or sold by merchants in St. Louis. In the same way the hinterland of Chicago overlaps that of both St. Louis and Kansas City, while that of New York extends over most of the northern United States as far as the Rocky Mountains.

The products received from the hinterland of a coastal commercial center are rarely of the same bulk and value as those sent out to other regions. This is evident in many of the cities in Table 40. Regions with more exports than imports have what is called a favorable balance of trade (see Table 39 K), while those with more imports than exports have an unfavorable balance (Table 39 L). An excess of imports over exports, however, is by no means necessarily an unfavorable sign, especially if a city engages in entrepôt trade or is a great financial center. At London, for example, in 1913, for every hundred dollars' worth of exports there were $161 of imports. This is because London is a great financial and shipping center. Therefore large sums must be paid to it by foreign countries for interest on investments and for carrying freight in the ships which it owns. These sums are paid in goods, not currency, and hence the imports must exceed the exports. In other cases such as Calcutta, Alexandria, and especially Galveston the imports are small compared with the exports. In such cases a few raw materials, jute and cotton in the present instances, are raised in great quantities in the hinterlands of the ports and are shipped in an almost unmanufactured state. In general an undeveloped region with only primitive or simple manufactures exports more than it imports, while the highly developed country imports a great deal and balances this against its investments. The character of a city depends very largely on the nature of the hinterland as thus indicated, for where the product is chiefly raw materials and food the activity is slight. The manufacturing and financial centers that want these products are the places where most of the active buying and selling is done. Thus although both New Orleans and Galveston carry on a greater foreign commerce than Boston or Philadelphia, their rôle is relatively passive. Their commercial activity is much less than that of the northern cities where exports and imports are more nearly equal and more varied so that they require much more planning in order to prepare and sell them.

The Detailed Position of Commercial Centers.—Thus far we have been considering the geographical conditions which cause commercial centers of a particular character or stage of development to be located in certain general types of regions. Now we must consider why the centers are located in particular positions within their general regions and why one position fosters growth far more than another. The main factor here is transportation. A city whose main business is commerce must be so placed that it is the natural catch basin for the produce of surrounding regions. Trade must flow to it more easily than to any neighboring center. The larger the natural catch basin, the larger the commercial center. Such basins are usually easy to locate on a relief map because they are primarily the natural drainage basins, for man utilizes nature's routes wherever possible, either floating goods down stream or building roads in the valley bottoms. New York City is a famous example of a commercial city which owes much of its supremacy over such neighbors as Philadelphia, Providence, and Boston to the Hudson-Mohawk Valley, which penetrates the Appalachian highland, thus giving easy access to the vast level region extending as far as the Rocky Mountains. St. Louis and New Orleans are other examples of commercial centers whose position depends on the relation of trade routes to river basins. They cannot rival New York and Chicago because their main routes run southward instead of eastward toward the most active regions of the United States and Europe.

The physical conditions which determine the position of a commercial center may be briefly summed up as follows: (1) Junctions of valleys, which usually means of rivers, as at Pittsburgh. (2) Crossing places of roads in a plain. Generally a plain contains many crossings since the roads and railroads can go almost everywhere. Hence, there are usually many small commercial centers as in Iowa and Indiana, but the greatest combination of cross roads may cause one city to outrival the others as Indianapolis has done. (3) Mountain gaps. Many trade routes are temporarily dammed as it were by meeting the mountains, and hence have to turn and flow parallel to the mountains until they find a gap as at Vienna. (4) Breaks in inland water routes also determine the position of a city as in the case of the falls of the Ohio where Louisville grew up. (5) The crossing places of rivers determine the location of a large number of cities among which are St. Louis and Omaha. The number of cities whose names contain the syllables "bridge" or "ford," or their foreign equivalents testifies to the great importance of this cause which determined the original position of many great cities including London and Paris. (6) The heads and to a less extent any main indentations of lakes, and the places where lakes meet land routes are favorable for the growth of commercial centers. Buffalo, Chicago, and Duluth are examples. (7) Closely allied to the lake centers of commerce are cities like Albany at the head of deep water navigation. Such places, like most of those where land and water meet, owe much of their importance to the fact that the means of transportation must be changed. The cargo must be transferred from ocean vessels to canal boats, railways, or trucks.

(8) Last and most important are the places where land routes meet ocean routes. Their importance is due to the extreme cheapness and ease of water transportation, and to the fact that when goods are once on the water they can be carried immense distances and in a great many directions without transshipment. Today, the oceans, instead of being barriers to commerce, may almost be called magnets. The Atlantic draws the United States into intimate contact with Europe and make us share its problems whether we will or no. And the Pacific draws us toward Japan and China so that we cannot ignore what happens in those countries. Commerce thinks of the ocean as a great level track with infinite switching possibilities and requiring far less fuel than even the best railway.

Ocean ports may be divided into four types according to the character of the harbor and its relation to routes on the land: (*A*) Open roadsteads such as Boulogne. These are usually poor because they do not offer good, safe harbors with plenty of depth and protection from the winds and waves. Also they are rarely located at the mouths of large valleys so that transportation toward the interior is hampered. (*B*) Bay ports like Boston. At such places the harbor may be safe, commodious, and deeper than that of Boston, and there may be plenty of room for docks and for a city, but if they are like Boston in lacking a gentle, easy valley leading far into the interior, they are much hampered. If the Hudson Valley ran eastward instead of southward from Albany, Boston rather than New York might be America's greatest city. (*C*) River ports like New Orleans and Antwerp have the advantage of easy communication inland, but they are often hampered by lack of depth and of space for anchorage, docks and wharves. Only by extensive digging or by going far up or down the river can room be found. (*D*) Ports with both a bay and a river, as at New York and San Francisco, are the most fortunate of all. They usually combine safe and commodious anchorage with plenty of room for docks and wharves and with easy access to the interior. Nevertheless, they do not necessarily determine the positions of the largest cities, for Riga and Nikolaiyevsk at the mouth of the Amur have such positions. So, too, does Smyrna, but it cannot rival Boston for example.

The growth of a commercial center is due primarily to the character of its hinterland. The part played by transportation is to determine the exact position of the city which is bound to grow up somewhere in order to handle the commerce of the hinterland. Constantinople, more than almost any other city, owes its growth to its wonderful combination of (*a*) a large bay, (*b*) a drowned river, (*c*) a deep inlet from the ocean extending far inland via the Black Sea, and (*d*) the crossing of land and water routes. Yet though its immediate position is perhaps more advantageous than that of any other city, it cannot rival New York, London, Paris, Tokio, Chicago, Berlin, and Philadelphia because it is not located in a region where cities as great as those just mentioned are yet needed.

The Human Factor in the Growth of Commercial Centers.—In the days of sailing vessels and post roads time was by no means so great a factor in transportation as today. Delays were expected because they were frequent, but today even an ocean steamer is expected to arrive almost on time. Then delays did not cause worry because there was no exact schedule time. Today people begin to look at their watches if a train is only ten minutes late, while many people begin to fret at a delay of a few hours in an ocean liner. These conditions have grown up partly because of the great expense of railroads and steamships. If a great steamer must lie idle waiting for room to dock or for a proper tide, the cost including interest on the investment as well as wages, wear and tear, may run up to $5000 per day, and even on a train a delay of a few hours is very costly. Consequently, railway yards, warehouses, dockage space, equipment for loading and unloading, deep channels, and the other facilities provided by man are often more important than natural advantages in helping a city to grow commercially. Since shipping, far more than land commerce, can easily move from port to port, the up-to-date ports of the world vie with each other in attracting it by providing facilities for loading and unloading quickly and cheaply. Conveyor belts and lifting towers, chutes, escalators, cranes, and cold storage warehouses are only a part of the equipment, although even so there is still a great amount of work for longshoremen.

The problem of building piers illustrates the human element in the growth of ports. Most American ports have room enough to build piers which are relatively cheap, but Hamburg, for example, has had to overcome the difficulty of a narrow river by the expensive method of digging slips. London and Liverpool have a disadvantage which most American and German ports do not suffer, for the rise of the tide is excessive. So English engineers have devised a system of docks that can be closed like locks. The question of the ownership of wharves is important, for dockage rates and management have almost as much to do with the attractiveness of a port as have the channel, wharves, and warehouses. Some ports are owned by the public, for example, the municipal ports of Hamburg, Rotterdam, Antwerp, and Bristol. Others including those of London, Liverpool, and Seattle are administered as public trusts by the government, and still others including Galveston, Savannah, and Southampton are owned by private companies. In Europe, public ownership predominates. In the United States the semi-public type is most common where the Federal government combines with the state or city or both, and where railroads and special dock companies also control part of the port.

A fine example of well-planned port facilities is the Bush Terminal at New York City. Built as an experiment, it was largely ignored by steamers for several years until its owners' enterprise had convinced shippers of its practicability. Now it forms a small but complete commercial city in itself, with a subsidiary manufacturing city. In 1917 the transportation system included 8 piers, 2 floating bridges, 116 warehouses, a cold storage plant with a capacity of a million cubic feet, 9 car floats, 16 barges, 11 locomotives, and 30 miles of track. Eighteen steamship lines operated from the terminal to foreign ports all the way from Norway to Zanzibar, and over a million tons of freight were handled. In addition to this there were 16 loft buildings, each a block in size, and together housing 220 industries. The working population of the terminal amounted to 24,000 people, which means that they and their families numbered at least a hundred thousand. So huge and complicated an organization is possible only where a great number of geographical conditions combine to produce a commercial city of the maximum size, with a maximum degree of activity, and serving a highly developed and populous hinterland with enormous resources.

EXERCISES AND PROBLEMS

1. Let several students cooperate to make a large wall map of cities from Table 4. Use three grades of symbols: (*a*) cities of over a million population, (*b*) 500,000 to a million, and (*c*) 300,000 to 500,000 (cities slightly under 300,000 which may have grown to that size by now may be included). Beside each city put the initial letter of its name.

Insert on the map an indication of the distribution of grades of civilization as shown in Fig. 25. Make a table showing the percentages of cities of each of your three grades and also the percentage of all large cities found where each of the five grades of civilization prevails. Explain your table.

2. Select two cities not mentioned in this chapter, and compare their hinterlands. Let one be a seaport from Table 40 and the other an inland city from Table 4 or Table 6. Look them up in encyclopedias, geographies, and other books, and write a description of the relation of each to its hinterland, including the kind of goods and services for which the city and hinterland rely on each other.

3. Make a list of four cities not mentioned in this chapter which fall under each of the following headings. (*a*) Primitive commercial centers, (*b*) simple commercial centers, and (*c*) complex commercial centers. Write out the reasons which lead you to place these cities in one class or another.

4. Make an exhaustive study of your own city or of the nearest large city mentioned in Table 6. Determine as far as possible the reason for its location. What type of city is it? commercial, industrial, or some other, and why? Study up its history to discover whether its relative importance among the cities of the country has increased or declined. (See Vol. I of the 1920 Census, Table 46.) Make graphs showing the actual increase and per cent of increase of population in your city or in the nearest available large city from as early a period as possible. Make another graph showing changes in relative rank from Table 47 of Vol. I of the Census. Let members of the class make similar graphs for several of the largest cities of the United States. Explain as far as possible the causes of rapid or slow growth.

5. Study the detailed position of a group of cities. Select 10 American and 10 foreign cities from Tables 4 and 6. Classify these according to the physical conditions which have been instrumental in their upbuilding. From the section of this chapter entitled " The Detailed Position of Commercial Centers " make a table as follows:

Name of City.	Phsyical Factors Important in Growth of City.							
	1	2	3	4	5	6	7	8
	———	———	———	———	———	———	———	———

In general does more than one reason determine the location of a city? Does your table indicate that one geographical condition is more important than others?

6. Make a similar classification of the nature of the harbors of 10 cities in Table 40, using the classification (*A*) to (*D*) in the text. What type of port is most common and why?

PART III

THE BUSINESS OF THE CONTINENTS

CHAPTER XVII

EUROPE: THE MOST ACTIVE OF THE CONTINENTS

The Volume of Europe's Business.—From the standpoint of business Europe is the most important of the continents. In normal times no other continent rivals it in the production of wheat, oats, rye, and barley; of sugar, potatoes, peas, cattle, dairy products, and hides; sheep, wool, and flax fiber; hay, horses, and swine; coal and iron; and probably poultry, wood, clay products, cement, stone, vegetables, berries, grapes, apples, and other orchard fruits, although few statistics are available for the last ten years. Europe also carries on more manufacturing than any other continent. Among the 50 items in the table of the world's chief products in Chapter II, there are only 21 in which any other of the five continents is supreme. Moreover, 20 of the 29 products in which Europe excels are of the first rank, being produced to an estimated value of over a billion dollars each year. Even North America, which comes next to Europe, excels the other continents in only 10 of the 50 products, namely, corn, cotton, copper, petroleum, water for power, tobacco, cottonseed, silver, lead and zinc. Among these only corn, cotton, and petroleum attain a value of over a billion dollars per year. Among the products in which Asia excels only three, rice, millet and beans, are of major importance, and there are only four others, raw silk, tea, rubber, and tin. South America leads the rest of the continents in coffee and flaxseed, Africa in gold, and perhaps sweet potatoes or yams, and Australia in none of the 50 main products. Thus the order is:

Europe	29	Africa	2
North America	10	South America	2
Asia	7	Australia	0

The importance of Europe is seen in foreign trade as well as in domestic production. Expressed in round numbers the normal foreign trade of the continents each year before the war was as follows:

Europe	$24,000,000,000	South America	$2,300,000,000
North America	5,000,000,000	Africa	1,500,000,000
Asia	2,500,000,000	Australasia	1,000,000,000

Although Europe was greatly injured by the war, it still leads by a wide margin. Its relative position would be much reduced if we considered only the trade of each continent with other continents instead of all foreign trade, but even if we exclude the trade of each country with others in the same continent Europe remains far ahead.

In transportation Europe has almost as great a supremacy as in primary production and commerce. The tonnage of ocean steamships belonging to the various continents in 1921 was approximately as follows:

Europe	36,000,000	South America	1,000,000
North America	18,000,000	Australia	700.000
Asia	4,000,000	Africa	300,000(?)

If figures for canal boats, coastwise traffic, and airplanes were available they would show the importance of Europe in an even greater degree. So, too, would the mileage of improved roads and canals. In railway mileage, to be sure, North America much exceeds Europe, the figures being about 320,000 miles against 230,000. The same is even more true in trolley mileage and in automobiles, for in 1921 North America's registration of ten and a half million automobiles comprised seven-eighths of the world's entire number. Nevertheless, in normal times the tonnage of freight carried by European railroads is about the same as by those of North America,—about two billion tons in 1911, with an average haul of approximately 100 miles in Europe and 140 in North America. On the other hand, the number of passengers that year was only about 1,100,000,000 in North America with an average journey of 33 miles, while in Europe it was five times as great with an average journey of 25 miles. Thus even in railroad business Europe exceeds North America, while if all kinds of transportation are considered her supremacy is much more marked.

Another way of estimating the business of the continents is by means of the total national wealth. This is extremely difficult to ascertain and as yet it is impossible to determine the full effects of the war. The best recent estimate is given in the following table and pertains to 1914.

ESTIMATED WEALTH OF VARIOUS COUNTRIES AT THE OUTBREAK OF WAR IN 1914

Country.	Approximate Degree of Accuracy: Grade.*	Amount in Dollars.	Amount per Head of Population. Dollars.
United Kingdom	I	70,500,000,000	1540
France	II	58,500,000,000	1470
Germany	II	80,500,000,000	1185
Switzerland	IV	3,780,000,000	999
Denmark	IV	2,330,000,000	855
Sweden	III	4,560,000,000	816
Holland	III	5,100,000,000	812
Belgium	III	5,850,000,000	752
Spain	IV	14,300,000,000	700
Italy	III	21,800,000,000	623
Austria-Hungary	III	30,000,200,000	589
Norway	IV	1,070,000,000	438
Russia	IV	58,500,000,000	413
United States	II	204,000,000,000	2060
Canada	II	11,200,000,000	1460
Australia	I	7,450,000,000	1550
Argentine	III	11,650,000,000	1660
Japan	IV	11,650,000,000	214

* Estimate is not likely to be inaccurate to a greater extent than 10 per cent in Grade I, 20 per cent in Grade II, 30 per cent in Grade III, but Grade IV *may* be inaccurate by as much as 50 per cent. Even if the actual figures depart considerably from those here given, which are taken from an article by Stamp in the Journal of the Royal Statistical Society, Vol. 82, 1919, the general result will not be appreciably altered.

Using this table as a basis and roughly estimating the other parts of the world we obtain the following:[1]

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[1] These estimates depend on the following assumptions, which are based on the countries given in the table. The estimates here given probably put Africa and especially South America too high because they assume a value which depends partly on the available land per person. Eastern and southern Asia rank very low in this respect.

Europe: Portugal, $500; Rumania, $400; Serbia, Bulgaria, Greece, $300; old Turkey, $200.

North America: Cuba, $400; Porto Rico, $200; Haiti and San Domingo, $100.

South America: Chile, $1000; Uruguay, $1000; Brazil, $600; Bolivia and Peru, $300; Paraguay, $100; remainder, $200.

Africa: S. Africa, $700; Tunis and Algeria, $250; Egypt, $200; Morocco, $150; remainder, $100.

Asia: Siberia, $400; Persia, $200; Arabia, $100; remainder including East Indies, $150.

Australasia: New Zealand, $2000.

ESTIMATED WEALTH OF THE CONTINENTS IN 1914

Continent.	Total	Per Capita.
Europe	$370,000,000,000	$800
North America	220,000,000,000	1500
Asia	130,000,000,000	150
South America	35,000,000,000	600
Africa	20,000,000,000	150
Australia	10,000,000,000	1700

The noteworthy feature of this table is that while both North America and Australia surpass Europe in wealth per person, the total wealth of all the rest of the world comes to only 415 billion dollars compared with 370 billion for Europe. Even with the reductions due to the war, Europe is probably still the wealthiest of the continents, and does the largest business.

Indirect Elements in the Business Activity of Europe.—The position of Europe in the world's business rests on ideas as well as on material factors. A large share of the world's advanced ideas are European. Although America made great contributions, France and England were the cradle of modern democracy. Although Christianity originated a little beyond the limits of Europe, the form in which it now influences the world came largely from that continent. In the same way modern education, philosophy, literature, art, and music are all essentially European. The modern sciences of physics, chemistry, geology, botany, biology, geography, psychology, and sociology likewise had their birth or at least a large part of their development in Europe. Even now the aggregate contribution of all the countries of Europe is probably greater than that of North America, or of all the other continents combined. In mechanics and machinery this has likewise been true from the time of the British invention of the steam engine down to the wireless telegraph and the extremely rapid improvement by Europeans in the airplanes which the Americans, Langley and Wright, first made practical. Only within a generation or two have the contributions of non-Europeans played any large part for a thousand years or more, and even without them Europe and the world as a whole would be almost as advanced as at present.

These matters have a close bearing on business. People deal with those whom they know. Many a man passes several stores where he could buy what he wants in order to reach a store which is not a bit better, but where he is acquainted with the clerks and knows the workings of the establishment. People likewise often refuse to take a fine brand of goods of which they have never heard, and insist on something whose name they know even if it is not so good. This may be foolish, but it is human nature. In the same way a country or continent which is known everywhere for its progress in government, religion, literature, art, science, and invention attracts business. Of course the United States possesses these advantages to a certain extent, but nothing like so highly as all the countries of Europe combined. The spread of Europe's ideas does much to create Europe's business.

The Influence of Europeans on Foreign Countries.—Another way in which Europe increases her business is by sending her sons and daughters to all parts of the world. Before the war this process was going on with great speed, as appears in the accompanying table, so that upwards of two million colonists went out from Europe every year. Thus Europe has peopled the United States, Canada, Australia, New Zealand, Argentina, Uruguay, Chile, and the best parts of Brazil, Cuba, and South Africa, and has furnished most of the upper classes in all the other countries of Latin America. All these places do a great deal of business with Europe simply because the present inhabitants or their ancestors came from there, their language and habits are like those of Europe, and they naturally turn to Europe both for ideas and for business.

Even more important than the colonists, from the business standpoint, are those who go to foreign lands, but expect to return "Home." Europe excels in this type of wanderers. The pioneers among them are often explorers. Such men as Marco Polo, Columbus, Champlain, and Humboldt illustrate the extraordinary ability of the men who have gone out from Europe to explore the rest of the world. After the explorer comes the missionary. The Jesuit Fathers in Canada, Carey in India, and Livingston in Africa, were among the great missionary pioneers. These men and their modern successors have unconsciously proved among the most competent agents in opening up new lines of business for the countries from which they come.

After the explorers and the missionaries come the business men. Few facts in respect to the distribution of mankind are more significant than the way in which almost every commercial city where the people are not of European origin has its European colony. Run through such a book as *The Statesman's Year-Book*, and see how universal this is. Abyssinia is almost as remote as any part of the world, but about 300 of the 50,000 people at Harar, the chief town, are Europeans. There, in almost the only independent part of Africa, the leading merchants, and the directors of the chief line of communication are Europeans. In Siam there were in 1909 between 1300 and 1500 Europeans, chiefly in

APPROXIMATE ANNUAL MIGRATION OF EUROPEAN COLONISTS INTO OTHER CONTINENTS BEFORE THE GREAT WAR *

FROM	To United States.	To Canada.	To Cuba.	To Brazil.	To Argentine.	To Uruguay.	To Australasia.	To Africa.
Austria-Hungary	200,000	17,000	......	3,000	6,000	......	200	100
Balkans (Bulgaria, Serbia, etc.)	3,000	4,000	......	....	1,000	......	....	......
Belgium	6,000	2,000	......	....	400	100	....	300
Denmark	7,000	800	50	400?	400?	......	100	......
France	9,000	2,500	250	1,500	5,000	400	....	?
Germany	30,000	5,000	100	5,000	4,000	400	200	......
Greece	22,000	1,000	......	?	1,500	......	....	......
Italy	225,000	12,000	200	25,000	70,000	5,000	1,300	10,000
Netherlands	7,000	1,200	......	?	300	......	....	......
Norway	9,000	2,000	......	?	100	......	....	......
Portugal	12,000	....	......	60,000	4,000	100	100	......
Rumania	2,000	1,000	......	?	200	......	....	......
Russia	225,000	30,000	......	12,000	15,000	100	....	......
Spain	6,000	200	32,000	30,000	140,000	5,000	....	30,000
Sweden	15,000	2,500	......	1,000	100	......	100	......
Switzerland	4,000	250	......	?	1,000	100	100	......
Turkey	15,000	700	300	7,000	17,000	......	....	......
United Kingdom	85,000	140,000	700	1,000	2,000	400	100,000	30,000
Approx. Total	900,000	220,000	35,000	170,000	270,000	11,000	100,000	70,000

* Data from Statistisches Jahrbuch für das Deutsche Reich, 1914, modified by British Statistical Abstract for the Principal and Other Foreign Countries, 1912.

Bangkok. These included 500 English, 190 Germans, 160 Danes, 150 Americans, and other Europeans in smaller numbers. How influential these people are may be judged from the fact that Siam has an American as General Adviser, British Judicial and Financial Advisers, a French Legislative Adviser, legal Advisers of various other nationalities, and British and other European officials in practically every other department of government. The metropolitan police force has been much improved under the superintendence of several English police officers lent by the Government of India. The provincial police administration includes a Danish inspector-general and Danish inspectors. English and French as well as American missionaries provide educational facilities for a large number of children.

Abyssinia and Siam are among the few parts of the world aside from Japan and China which are not under the control of Europeans or Americans. Where Europeans control regions mainly occupied by other races, and even in countries like China and Japan, the European colony is almost invariably remarkable for its wealth and influence. Chinese and Japanese are indeed found in many foreign cities, and there are American colonies in places like Constantinople, Calcutta, and Shanghai, but only in a few places such as Mexico can even the Americans compare in number and influence with the Europeans. Thus Europeans penetrate almost every part of the world and form a network which helps to bind other nations to Europe.

The Loss of Europe in the Great War.—Since the Great War many authorities have feared that Europe has lost her dominance. During the war, each year's destruction was as great as the savings of four ordinary years; after the war the great waste of former savings continued for years in Russia and Turkey while even in England, France, and Germany it was two or three years before the process of restoring the waste was well under way. Moreover, Europe lost not only material wealth which can be replaced in a few decades but human wealth which can not be replaced for generations. The war alone cost 19½ million men, taken largely from the most competent parts of Europe. Of the men between the ages of 20 and 44 France lost 20 out of every hundred; Germany, 15, and Great Britain, 10. In addition to this many million were maimed or suffered in health so that they cannot be full producers. Influenza, typhus, and other diseases probably killed 30 million people. Because of war, disease, and famine, the number of children born from 1914 to 1920 is estimated to have been about 40 million less than if peace had prevailed. Thus Europe's loss because of the war may possibly have been 80 million human beings. The direct cost of the war to Europe, as reckoned by national debts, was something like 125 billion dollars; and the indirect loss in shipping, damaged property, and loss of production is often estimated as almost as much more.

In addition to all this, the inability of Europe during and after the war to carry on business as usual and the great depression of European industry allowed Japan and especially the United States to capture a large part of the trade in South America, Asia, and even Africa. For example, in 1912, the United States drew 49 per cent of her imports from Europe, and 13 per cent from Asia, as appears in the following table. In 1918, she was drawing only 14 per cent from Europe and 27 per cent from Asia. In other words, before the war about half of the imports to the United States were manufactured goods from Europe, while one-eighth were raw materials from Asia. During the war the United States ceased to rely on Europe for manufactures, so that the trade in this line fell to 14 per cent. She increased her own manufactures so much that she needed twice as large a percentage of raw materials from Asia, in order to work them up in her factories. These manufactured goods she sent not only to Europe for use in the war but to other countries which Europe had formerly supplied.

PERCENTAGE OF THE UNITED STATES FOREIGN TRADE IN EACH CONTINENT IN 1912 AND 1918

Continent.	Exports.		Imports.	
	1912.	1918.	1912.	1918.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Europe	60	63	49	14
North America	23	20	20	31
South America	6	5	13	19
Asia	5	6	13	27
Oceania	3	2	2	4
Africa	1	0.9	1	2

Japan, as well as the United States, expanded her manufactures and thereby seized markets in eastern Asia and in the East Indies which had formerly been in the hands of Germany, England, France, and other European countries. Even in Australia, for example, Japanese sales increased as follows between 1913 and 1917:

Fabrics and clothes	$2,300,000 to $7,800,000
Manufactured metals	34,000 to 870,000
Chemical products	630,000 to 1,780,000
Crockery and glassware	96,000 to 1,280,000
Fancy articles and jewelry	93 000 to 620,000

The Recovery of Europe.—In view of the enormous handicap under which the war placed Europe later events are extremely interesting. In Great Britain, for example, the tremendous drop in foreign trade during the war has been followed by an almost equally sudden increase. In a relatively few years Great Britain will apparently have regained much of her old position. Her percentage of the world's foreign commerce will probably never be as large as formerly, for the United States, Japan, and to a lesser extent other countries, are not only growing rapidly in population but are learning the arts of manufacturing and commerce and are becoming able to play a part corresponding to the number and energy of their people. Great Britain forged ahead of other countries when modern manufacturing and commerce first arose, because she was helped by her supplies of coal and iron, and by the fleet which had grown up in part because she is an island. Other nations have since been catching up with her just as between the ages of ten and fifteen a small boy may become as tall as his father. The indications are, however, that within a few decades or a generation or two Britain's share of world trade will be nearly the same as if there had been no war.

The same is true of other European countries except that their speed of recovery varies according to their degree of progress. Even though France suffered terribly she seems to be moving back toward her old place with encouraging rapidity. Russia, on the other hand, had scarcely started on the road to recovery in 1923. The upshot of the whole matter seems to be that Europe is by no means in danger of losing her business supremacy. She has been obliged to accept Japan and especially the United States as rivals, and the United States seems to be in little danger of losing its position as the most active of all countries in business. New York seems likely to vie with London as the world's financial center, but apparently the geographical conditions which we are studying in this book would have led to this result, war or no war. The war merely hastened processes which were already in operation. It weakened Europe very seriously, but it did not destroy the geographical and racial conditions which have made Europe the most active of the continents.

The Reasons for the Business Activity of Europe.—We must now inquire into the causes of the business activity of Europe both at home and abroad. Some of the more important of these may be classified as follows:

- I. Geographical causes
    - 1. Climate
    - 2. Relation to the ocean
    - 3. Relief
    - 4. Mineral resources
- II. Human causes (dependent on above)
    - 5. Race
    - 6. Health
    - 7. Historical development
- III. Secondary causes growing out of these
    - Religion
    - Education
    - Government
    - Exploration
    - Mechanical inventions

(1) *Climate.*—The climate of Europe excels that of any other continent in almost every respect. (*a*) In no other continent does so large a proportion of the area receive sufficient rain at all seasons. More than 20 inches per year fall everywhere except in the far east, the far north, central and eastern Spain and small areas in eastern Italy and Greece. More important than this is the fact that in June, July and August,

which are the chief growing season, more than six inches fall everywhere except in northern Russia, where the temperature is too low for agriculture, and in the three southern peninsulas and southeastern Russia.

(*b*) Europe is peculiarly fortunate in having a large area where extremes of temperature are unknown. The northern half of the continent, as appears in Fig. 4, has no month when the temperature for night and day together averages above 70° F. The southwestern half has no month when the temperature averages below 30° F. The region where both these conditions prevail includes the whole of Great Britain, Belgium, Netherlands, and Denmark, the northern half of France, the western half of Germany, the Swiss lowland, the lowland part of Austria, a mere fringe of northern Spain, and similar fringes in the south of Norway and Sweden. Such conditions are almost ideal for human health and activity. They are also highly favorable for agriculture since farm work is interrupted for not more than two or three months in winter, the farmers are not made sluggish by prolonged and extreme heat in summer, and the temperature is high enough for a great variety of crops. Aside from a few mountain areas, which are often the health resorts of

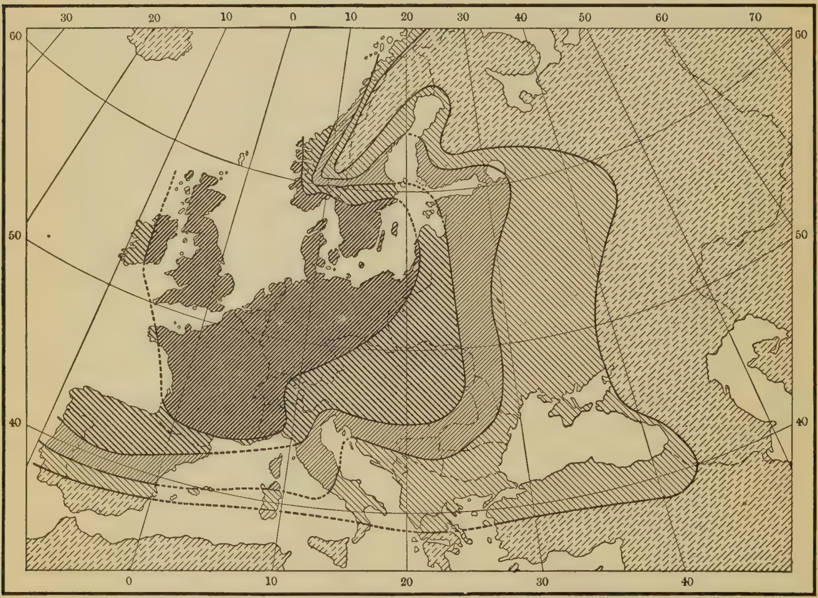


FIG. 57.—Distribution of Climatic Energy in Europe.

Depth of shading indicates the degree to which the climate makes people energetic.

low latitudes, the only other parts of the world that have equally favorable conditions of temperature are (1) a limited strip of land on the eastern coast of the United States including Long Island and southern Rhode Island, (2) a narrow fringe often only a few miles wide along the Pacific coast from San Diego to Sitka, (3) a similar strip along the coast of Chile, (4) a considerable area in the Argentine plain south of Buenos Aires, (5) the southeastern tip of Australia together with Tasmania and New Zealand, (6) the merest tip of South Africa near Cape Town, and (7) a tiny area at the northern end of the main island of Japan. These regions, it will be seen, are located in countries where civilization is high, business is active, and Europeans can thrive. All, however, are much smaller than the European area. Moreover, aside from the eastern United States, most of them lack sufficient contrast between summer and winter, and many have a long dry season in summer.

(*c*) The third great climatic advantage of Europe is its abundant storms. These not only bring rain at all seasons, but give the constant changes of temperature and of sunshine which are one of the most important elements in producing good health and vigorous activity. Among the regions with a favorable range of temperature only the eastern United States has more storminess than Europe, while Japan, the Puget Sound region, and New Zealand follow Europe but do not equal it.

(2) *Europe's Highly Favorable Relation to the Ocean.*—In the advantages of its relation to the ocean Europe stands in a class by itself. These advantages arise partly through climate and partly through transportation. Climatically the first important feature is that Europe lies east of an oceanic region in which the warm Atlantic Drift penetrates to an unusually high latitude through the opening to the Arctic Ocean between Iceland and Norway. In winter this causes the air over the ocean west and north of the British Isles to be 30° F. or even 40° F. warmer than the average for the corresponding latitudes over land and sea together. The prevailing westerly winds of these latitudes not only are warmed by the water but bring a high degree of humidity to the land and thus prevent low temperature far into Europe, especially in the northern half. They also increase the winter rainfall, especially in the south.

The oceanic effect is intensified by the North Sea and Baltic arm of the ocean extending eastward about 1200 miles from the open ocean and the Mediterranean and Black Sea arm about 2500 miles. The effect of these conditions, joined with the comparative absence of mountains along the coast of western Europe, is evident in the following comparison of Petrograd with Chippewyan which lies in nearly the same latitude on Lake Athabasca in northern Canada.

Month.	*Chippewyan,* Athabasca. 59° N., 111° W. Altitude 650 Feet.	*Petrograd.* 60° N., 30° E. Sea Level	Amount by which Petrograd is Warmer than Chippewyan.
January	−16°	15°	31°
February	− 9°	17°	26°
March	4°	24°	20°
April	28°	36°	8°
May	45°	48°	3°
June	56°	59°	3°
July	62°	64°	2°
August	56°	61°	5°
September	45°	52°	7°
October	33°	40°	7°
November	14°	29°	15°
December	1°	20°	19°

Both places are about 800 miles from the open ocean. The slightly more northern latitude of Petrograd almost compensates for its slightly lower altitude. Yet in midwinter the temperature of Petrograd averages 31° F. higher than at Chippewyan; at Petrograd the ground thaws in April and is not frozen again till November; at Chippewyan the ground does not become soft till May, while early October sees it frozen once more. Moreover, Petrograd, with 20 inches of rain, has about half as much again as Chippewyan.

Such conditions of relative warmth and abundant rain prevail over most of Europe, but diminish toward the east and south. Hence, most of Europe has relatively mild winters which do not have an unduly depressing effect upon either health or agriculture. The northern position of the continent gives it fairly cool invigorative summers, while the long days in such high latitudes give sunshine and warmth enough for agriculture. Only in southern Europe is there anything to compare with the steady heat which makes the city of Washington, for example, a place which many people dread in summer. Even in southern Europe the presence of the Mediterranean sea lowers the summer temperature somewhat and helps to prevent Italy and Greece from being deserts.

The advantage of transportation which Europe derives from the sea arises partly from the way in which two great oceanic arms and many minor bays and gulfs penetrate inland. The only other regions which compare with Europe in this respect are (1) the Caribbean region, including the West Indies and the lands around the Gulf of Mexico and the Caribbean Sea, and (2) the far eastern region, including the East Indies, the Japanese Islands, the Malay Peninsula, and the coasts of Indo-China, China, Chosen, eastern Siberia, and northern Australia. If water transportation alone gave preeminence in business, these two regions might rival or surpass Europe. As it is, Europe's facilities for transportation by water confirm the advantage given her by climate. No part of Europe outside Russia is more than 400 miles from the sea, and most parts are within 200 miles. So valuable are the oceans as waterways that goods from all parts of Germany except the immediate Danube valley can be shipped to Bulgaria and the other Balkan states more cheaply by sea than by rail or even by the Danube waterway. Such conditions help to account for the extraordinary development of Europe's coastwise traffic. They give her cheaper transportation than the United States without the enormous expense of such an extensive railway net.

(3) *How the Relief of Europe Favors Business.*—A physical map of Europe shows (1) a northwestern highland embracing chiefly Scotland and Scandinavia, (2) a great central plain whose western outliers are in Ireland, southern England and western France, and which extends eastward through Belgium where it is narrowest, to Germany, southern Scandinavia, Poland, and especially Russia where it broadens to great size; (3) a central system of mountains beginning with the Pyrenees, continued in the Alps and Carpathians, and ending in the Balkans and the Caucasus; and (4) three southern peninsulas one of which has a southwestern trend, while the other two trend southeast.

In comparison with the other continents this system of relief is highly favorable. Lines of transportation, as we saw in Chapter VIII, tend to converge on the greatest centers of activity and population. Although railroads try to avoid mountains, many great trunk lines run athwart them in order to connect active centers like Philadelphia and Pittsburgh, the Atlantic and Pacific coasts of the United States, or Argentina and Chile. But in Europe many natural routes lead toward a single center. That center is the southern part of the North Sea in the midst of the world's largest area of healthful stimulating climate, a place where three races meet and blend, as we shall shortly see. Within 300 miles of this center the number of great cities is several times as large as in any equal area in any other part of the world. From eastern Europe, the Russian plain narrows westward so that the traffic is concentrated between the Baltic Sea and the mountains of southern Germany, and tends to reach the ocean on the shores of the North Sea. Farther north, the two branches of the Baltic direct the trade of their coast toward the North Sea, and the Kiel Canal gives a direct water route to the Straits of Dover. Another great stream of traffic comes eastward across the Atlantic or northward along the coast of Africa. Part of the traffic is diverted into the Irish Sea to Liverpool, or into the Bay of Biscay to Bordeaux, but far the larger part crowds into the English Channel and passes the Straits of Dover.

From eastern and southern Asia, from Australia, the East Indies, and the east coast of Africa, the traffic is drawn as by a magnet toward the intense commercial and industrial activity of the North Sea region. Passing through the Suez Canal, the traffic finds it easier to make a detour by water to the west through the Straits of Gibraltar rather than travel overland; most of it keeps steadily on its way to the North Sea region. A small side stream flows up the Adriatic Sea to Trieste and Fiume where the low mountains allow it to pass over to Vienna on the outer edge of the region of greatest activity. A somewhat larger portion stops in Italy. At Marseilles another portion seeks the land, but part of even this moves up the Rhone Valley, another of the natural channels which lead toward the North Sea region.

Inland waterways as well as land routes and ocean waterways converge upon the regions near the North Sea. The Seine and Marne, the Rhine, Elbe, and Vistula all flow in general toward the North Sea center. The more directly they flow in this direction, the heavier their traffic. The Rhine in proportion to its size is the greatest long-distance carrier of traffic among the rivers of the world. Thus the topography of Europe, more than that of any other continent, invites traffic toward the regions of greatest activity.

(4) *The Good Fortune of Europe in its Mineral Deposits.*—The parts of Europe near the North Sea are among the most favored regions of the world in mineral resources as well as in climate, oceanic relations, and topography. Scattered here and there on the borders of the British plain with outliers in southern Scotland and northern Ireland, are deposits of fine coal. The formations which contain this coal appear to extend eastward under the North Sea, for they reappear in Belgium, northern France, the Saar Basin and the German Ruhr coal field near Dortmund and Essen. Farther east the great manufacturing centers of Chemnitz, Breslau and others depend on neighboring coal fields, while in upper Silesia, where Germany joins Poland and Czecho-Slovakia, lies another coal region. Still farther east, in the Donetz Basin north of the Sea of Azov the same general formation reappears. Aside from this interrupted band extending roughly from Wales to southern Russia there is little good coal in Europe, that near Moscow for example being of a poor quality. Not far from the coal, especially in Britain, France, Germany, and Russia, lie deposits of iron. This combination of

the two most valuable minerals in the very region where the other main geographical conditions are most favorable has been an extraordinary stimulus to manufacturing and transportation.

Although Europe is relatively poor in mineral resources aside from coal and iron, those which it possesses are well exploited. The northwestern mountains seem to contain practically no ores except the fine iron of northern Sweden. The southern peninsulas contain the iron of northern Spain and a great variety of other minerals. These other minerals have been so well developed that Europe, including the Ural Mountains, provides about 90 per cent of the world's platinum, potash, and magnesite, about 80 per cent of the mercury, 60 per cent of the graphite, and not far from half of the salt, bauxite, saltpetre, and zinc. These, however, are of small importance compared with the fact that normally Europe produces about half the world's coal and more than half the iron. No other region of similar size has so fortunate a combination of a fine supply of coal and iron, a climate good for both man and agriculture, abundant level lands of high fertility, a relief which concentrates the lines of transportation upon the very region where the climate, relief, and minerals are most favorable, and wonderful facilities for ocean transportation which bring the trade of the world to the area where the other geographical advantages are concentrated.

(5) *The Commingling of Races in Europe.*—To the physical advantages of Europe must be added those of race. Most people think their own race the best. They also suppose that racial inheritance can overcome the effects of a bad environment indefinitely. How far this is true is not yet known, but one or two things are clear. The European or white races almost certainly inherit greater mental capacity than the aboriginal red race of the Americas, or than the black races of southern Asia, and Australia. How the inherited capacity of the white races compares with that of what are sometimes called the brown races including the Arabs and Hindus, and of the yellow races including the Chinese and Japanese has not definitely been determined. This much, however, seems fairly certain; the European races have now for a long time had the advantage of a better physical environment than any others except perhaps the Japanese. This environment has played a part in giving them the advantage of unusual racial energy and alertness. Nevertheless there are marked racial differences in different parts of Europe. Fair-haired, aggressive Nordics, the kind of people who seem to have the strongest tendency to make inventions and plan great schemes, predominate in Scandinavia and all the regions bordering the North and Baltic Seas. Broadheaded Alpines, a people who are generally regarded as patient, persistent, and relatively sub-

missive occupy most of Russia, the Balkan regions, and the highlands of central Europe. They are the kind of people who, when once an idea has been proposed or a plan of operations has been started, have special capacity to carry out its details and to stick to the often tiresome repetition and regulations which are necessary to bring an idea to its perfect fruit. Farther south the three peninsulas and also the western parts of France and Britain contain an unusually large proportion of dark Mediterranean people among whom the poetic and artistic temperament is unusually common. To a high degree they have the capacity for enthusiasm and for making friends.

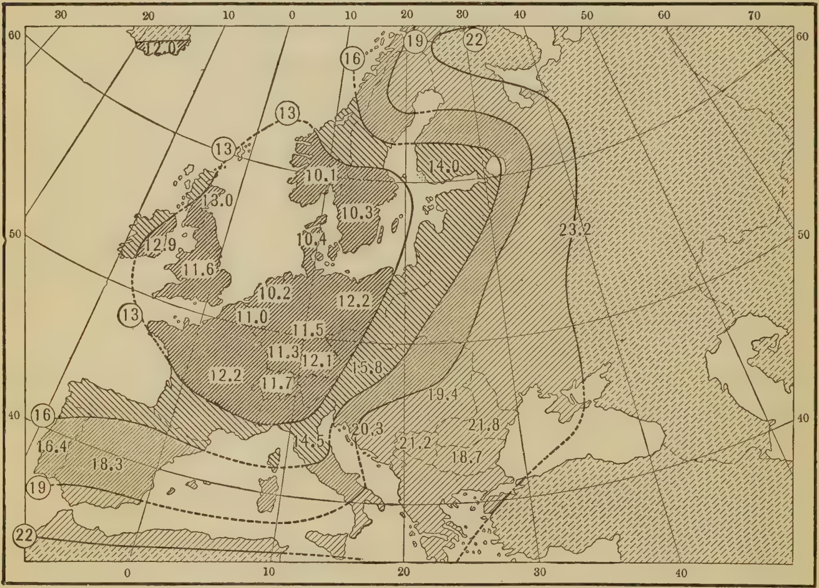


FIG. 58.—Distribution of Health in Europe.

In the regions within a radius of four or five hundred miles of the Strait of Dover these three races are mingled far more than anywhere else, unless it be in the United States. In the European region all three of these highly competent races enjoy the stimulus of unusually favorable geographical conditions, and hence have good opportunity to make their special contributions to human progress and to business. Thus the favored North Sea region has a peculiarly strong racial combination which adds another to the complex series of reasons why this region leads in so many activities.

(6) *The Contribution of Health to European Business.*—Another marked characteristic of Europeans is their energy. In Chapter VI

we saw that health is one of the most important conditions for active business. We have also seen not only that Europe as a whole is the most healthful of the continents, but that the region around the North Sea is probably the most healthful in the world aside from certain small areas such as New Zealand or parts of the Pacific coast of North America. Because of the climatic conditions the people would apparently be unusually strong and well even if there were no such thing as modern medicine. But the very fact that they possess energy makes them more ready than most people to profit by advances in medicine and sanitation. Unfortunately the Great War produced an enormous amount of disease and death, and the semi-starvation which afflicted scores of millions of people year after year has caused millions of children to grow up with impaired physiques. This condition is worst in relatively backward countries like Russia, but it played a part even in France and Germany. Nevertheless, today as for centuries, Europe, especially in the parts around the North Sea, is strengthened in business as in every other activity because her people are healthy enough to work hard and to work intelligently.

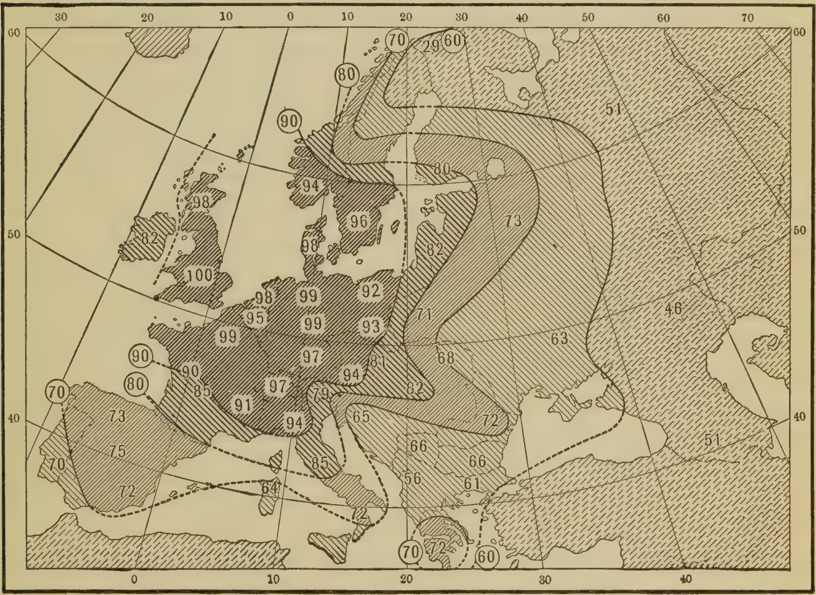


FIG. 59.—Distribution of Civilization in Europe.

(7) *The Part Played by Historic Development.*—The vigor of the Europeans has enabled them to profit by a vast number of historical events which elsewhere could not have produced such great

fruits. Thus the Europeans have profited greatly from Christianity. They had the strength of character to accept the Christian ideas of responsibility for one's neighbors, and of honesty as the best policy. Hence, in spite of many failings, Europe maintains high standards in business. A business man whose dealings run into millions of dollars each year remarked, "I deal with half a dozen nations. From others I want a written contract, but from an Englishman a letter is enough, and with a Hollander a memorandum in his own pocket suffices." This estimate of racial honesty is probably fair. It is highly significant that the two nations that are most active commercially are the two that are most honest. Again, the physical, intellectual, and moral strength of Europe makes her more able than other parts of the world to profit by the wisdom of men of genius. It required people of high average ability to understand and perpetuate the work of such men as Shakespeare, Galileo, Columbus, Stevenson, and Darwin. Elsewhere many geniuses may have left little mark because they lived among people who could not carry on their work. Of course all this applies to people of European race in other continents, but they are part of Europe in the sense that their inheritance comes from that continent.

The importance of men of genius cannot be too strongly emphasized. If backed by competent disciples they give a country a start which is an almost inestimable advantage. Such men in the North Sea regions invented and perfected most of the modern methods of transportation, communication, manufacturing, and commerce. At once the people took them up and improved them. Thus in almost every line western Europe got a start ahead of its competitors. The United States was a little slower in starting, Japan still more so, and other nations are as yet mere beginners. For a time all sorts of business activities may increase in other countries more rapidly than in Europe, just as a child of two may grow much faster than one of twelve. But Europe has already grown to be such a giant in business and the advantages of a good start are so great that no other continent can easily overtake her. It is a calamity not only for Europe but for the world that the Great War wrought most havoc in the very regions where progress has been most rapid. The same thing has happened in the past, for some of the worst wars in former days were those where the dominant civilizations of their day clashed, Babylonians with Chaldeans, Assyrians with Egyptians, Greeks with Persians, Athenians with Spartans, and Romans with Carthaginians. In all these ancient cases the fighting produced terrible results from which one or both the contestants never recovered. Whether the same thing will happen today no one can tell. In some respects recovery has indeed been rapid, but in others the full consequences of the war may not be evident for generations. But one important factor is different now from what it ever was before: Never in the past, so far as we can tell, was there a region which equaled the regions around the North Sea in its combination of climate, ocean, relief, minerals, races, health, and a background of historic achievement on which to build a progressive future.

EXERCISES AND PROBLEMS

1. Compare the cities of Europe with those of the rest of the world. Divide the large cities of Tables 4 and 6 into three groups: (*A*) over one million population, (*B*) 500,000 to one million, (*C*) 300,000 to 500,000. How many has Europe in each group compared with each of the other continents and with all the others combined?

On an outline map of the world indicate the location of the cities of the three groups noted above, using symbols of three different sizes. In what regions do you note a pronounced grouping of great cities? How does the European group compare with the others? Explain its location.

2. Compare the production and possessions of Europe with those of the rest of the world in as many respects as possible. In Tables 1, 11, 14, 25, 30, 33, 34, 38, and 39, let the class divide up the various columns (except those labeled per capita, percentage, per thousand, per acre, etc.) Obtain for each column the total for each continent and for the world. Reduce the continental figures to percentages of the world total, and make from the percentages a table showing the relative rank of all the continents in as many lines of production as possible. In which does each continent rank first? How do your results compare with the statements in the text?

3. Study the problem of Exercise 2 in another way by picking out the highest country or state in the tables where some activity is expressed as a percentage, per capita, per acre, etc. Use Tables 10 A; 12 with 18, but note that the figures in Table 12 must be divided by 1000; 13 with 17; 15 with 21 and 22, but divide 15 by 100; 30 B; 33 C, F, H, with 37 C; 34 B and D, with 37 H and J; 34 G and H; 39 B, E, G, and J. On this basis prepare a table on the following model:

RELATIVE ACTIVITY OF THE CONTINENTS

I. Name of Country or State Standing First. II. Standing of Highest Country or State.

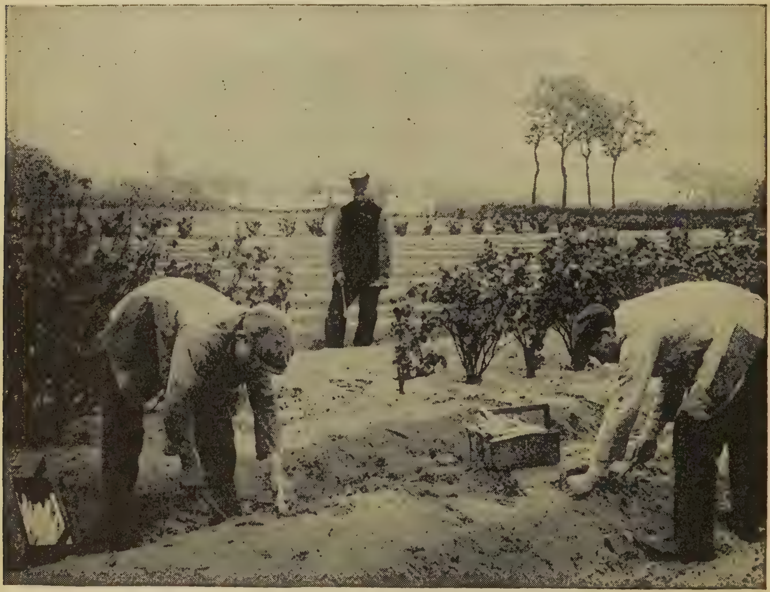
Condition or Activity.	Table.	Africa.		Asia.		Australia.		Europe.		North America.		South America.	
		I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.
Per cent of Productive Land.	10A	Tunis	72	Japan	78.6	Dutch East Indies	58.9	Hungary	96.2	U.S.	46.2.	Uruguay	88.5
Corn per Capita....	12A, 18D	Egypt	5.7	India	0.3	Queensland	5.4	Rumania	13.8	Iowa	173.0	Argentina	20.0
Wheat per Capita ...	12B, 18A												
Oats per Capita ...	12C, 18C												

Let each member of the class copy the table and prepare a written report as to the general type of activities or conditions in which the various continents stand highest, and as to the relative position of Europe.

CHAPTER XVIII

THE BUSINESS OF EUROPE

The Centers of Activity.—Individual occupations, as well as civilization and business in general have certain centers where their development is especially high. In Europe agriculture, for example, has such a center in northern France from Normandy northeastward along the English Channel to Belgium. A few hundred or a thousand miles away the intensive farming and market gardening of this region give place to one-crop agriculture, cattle and sheep raising, irrigation, fishing, and lumbering. In other occupations a similar charge takes place as one travels away from the European centers of high development. Western Germany serves as an illustration of the most highly developed mining communities, for nowhere else is coal more thoroughly utilized.



Keystone View Company.

FIG. 60.—Intensive Horticulture in Holland.

In secondary production England seems to have the strongest claim to be reckoned as the main center, for manufacturing is there developed to an extraordinary degree. Transportation and commerce comprise another great group of activities which are most highly developed in certain centers and decline outward. The Netherlands stand very high in this respect. Such activities as government, religion, science, art, and literature likewise reach their highest development within three or four hundred miles of the Straits of Dover. If the area of greatest activity were not divided among three great nations and several small ones, all speaking different languages and all more or less jealous of one another its supremacy would be still more evident.

The European Center of Agriculture.—Let us consider the agriculture of Normandy, Picardy, Artois, and Flanders, a region extending roughly from Le Havre and Paris on the southwest to Brussels and Bruges on the northeast. In spite of the ravages of war, this Franco-Belgian area, no longer than Massachusetts, is one of the fairest districts in the world. The following table shows how many of the crops and animals mapped in Finch and Baker's admirable *Geography of the World's Agriculture* are produced abundantly in this area. Two stars mean abundant production, one star moderate production, and no star no production worth mentioning. The stars in parentheses after the designation Ill. refer to an area equal to the Franco-Belgian area and extending east and west across the richest part of central Illinois.

AGRICULTURAL PRODUCTS OF THE FRANCO-BELGIAN COASTAL STRIP FROM NOMANDY TO FLANDERS

(1)**	*Wheat.* Fig. 43. In proportion to its size the little Franco-Belgian coastal area produces more wheat than almost any other part of the world. France, as a whole, although smaller than about 30 other countries or regions for which the statistics are published independently, stands fourth in the amount of wheat produced. It has a greater percentage of its cropped land in wheat than has any other country	(Ill.**)
(2)*	*Rye.* Moderate amount, but more than in almost any part of the United States or England	
(3)	*Corn.* None, summers too cool	(Ill.**)
(4)**	*Oats.* More abundant than in almost any other region except central Illinois and northern Iowa	(Ill.**)
(5)*	*Barley.* Small quantities, a crop of relatively unfavored regions	
(6)	*Sorghum and Millet.* None, too cool	(Ill.*)
(7)	*Rice.* None, too cool	
(8)	*Cotton.* None, too cool	
(9)**	*Flax.* Abundant, especially in Belgium. France stands fourth among the countries of the world in the production of the fiber	

(10) *Hemp.* Practically none
(11)** *Tobacco.* Abundant, especially in Belgium. France stands thirteenth among the countries of the world, and fourth among the countries of Europe
(12)** *Potatoes.* More abundant than in almost any part of the United States except Aroostook County, Maine........................ (Ill.*)
(13)** *Sugar.* Very abundant. France ranks seventh among all sugar producing countries and fourth among those producing beet sugar
(14)** *Apples.* Abundant, especially in south........................ (Ill.**)
(15) *Peaches.* Few, summers too cool........................ (Ill.**)
(16) *Grapes.* Few, summers too cool
(17)** *Pears, plums, cherries, berries.* Abundant and varied.............. (Ill.**)
(18) *Citrus fruits.* None, too cool
(19) *Olives.* None, too cool and damp
(20) *Coffee.* None
(21) *Tea.* None
(22) *Sweet potatoes and yams.* Few or none
(23)** *Vegetables.* Very abundant. Data for separate kinds not available. (Ill.**)
(24)** *Dry beans.* Abundant
(25)* *Dry peas.* Fairly abundant........................ (Ill.*)
(26)* *Buckwheat.* A little........................ (Ill.*)
(27)** *Hops.* Abundant.
(28) *Kafir and milo.* Not raised, too cool
(29)** *Hay and forage.* Great quantities........................ (Ill.*)
(30)** *Root forage.* Large quantities........................ (Ill.*)
(31)** *Horses.* Very abundant. Percherons originated in Normandy..... (Ill.**)
(32)* *Mules and asses.* A moderate number........................ (Ill.*)
(33)** *Cattle and dairying.* Very important, especially in Belgium........ (Ill.**)
(34) *Buffaloes and carabao.* None
(35)** *Swine.* Abundant, especially in Belgium........................ (Ill.**)
(36)** *Sheep.* More abundant than in any part of U. S. except Ohio..... (Ill.*)
(37)* *Goats.* A moderate number
(38)** *Poultry.* Very abundant........................ (Ill.**)

The climate of northern France of course forbids the cultivation of many of the thirty-eight products which the experts of the United States Department of Agriculture have included in their atlas of agriculture. Nevertheless, eighteen are raised in great abundance, six in moderate abundance, and only fourteen are negligible. In an equal area in central Illinois, almost the best agricultural region in the United States, twelve are raised abundantly, eight moderately, and eighteen are negligible. Both regions produce an abundance of wheat, oats, apples, vegetables, horses, cattle, and swine, but northern France also produces an abundance of eleven other products and central Illinois of only five.

The Farms of the Franco-Belgian Center of Agriculture.—One noticeable feature of the Franco-Belgian region from Normandy to Flanders is the luxuriance of the vegetation. In Normandy, according to a local proverb, "grass grows so fast that it pushes up the cattle, and a stick lost in the grass in the evening cannot be found next day."[1] In the interior of Flanders, "thick hedges, rows of trees in imposing avenues, clusters of elms about the houses, groves on the less fertile portions, adorn the countryside, half concealing it beneath a veil of green." The pastures are chiefly meadows where horses, cattle, sheep, and swine are seen at certain seasons. But so intensive is the cultivation that much of the year the animals are stall-fed, the crushed fibers of the sugar beet being one of the most nutritious foods. Whether the animals are in the meadows or clustered around the barns, they are always present on practically every farm. The farmers have learned the lesson of preserving the fertility of their land not only by rotating the crops, but by keeping many animals. Hence, the soil is still rich after hundreds of years of cultivation. Much of the time on a tour among the farms one feels as if riding on park roads through a market garden. There are few ragged edges such as abound in America, no bushy pastures, no desolate "cut-over" hillsides where the forest has been slashed down. Each field is devoted to some useful crop; each patch of trees is carefully cultivated and pruned, the best trees for lumber being cut at intervals without spoiling the young trees that are not yet ready.

There are not trees enough to warrant wooden houses or even many wooden sheds. So most of the buildings are of brick or sometimes stone, which gives a substantial, permanent appearance. And appearances conform with facts, for outside the war-stricken areas probably half the people live in houses built a hundred or more years ago. According to American ideas many other features are somewhat old-fashioned. For example the small fields are cultivated by hand more than by machinery. Nevertheless, for intensive, profitable cultivation, for purposeful industry, and for real comfort and pleasure few parts of the world exceed this garden spot at the center of European agriculture.

How Agriculture Changes Outward from the Franco-Belgian Center.—Northwestward across the Channel in southern England the country is almost as thoroughly cultivated as in northern France, although the variety of crops decreases. There are less rye and oats, while barley is more plentiful. Flax, tobacco, the sugar beet, and goats almost disappear, but roots for animal forage become more noteworthy. In other words, while the farming is still of the same intensive type, it becomes less varied. Yet in yield per acre England often surpasses France, though not Belgium.

In Ireland, where the winters are warmer, the summers cooler, and all parts of the year damper than in France, the type of agriculture changes. Oats are the only really large cereal crop, and potatoes the one great crop in the vegetable group. Certain places, indeed, cultivate considerable wheat, rye, barley, and flax, but these are of minor importance compared with either animals or the hay and forage which they consume. Ireland has about 150 cattle per square mile compared with 83 in Iowa in 1920, 56 in Wisconsin, and 46 in NewYork. In fact, including its many horses, sheep, goats, and swine, and the relatively numerous donkeys, Ireland has more animals in proportion to her area than any other country in the world. Unfortunately the country suffers from one-crop agriculture. Many Irish farmers rely largely on potatoes, oats, and cattle. The country is so moist, swampy, and cloudy, that highly diversified farming is difficult, and economic distress is common.

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[1] Blanchard and Todd: Geography of France.

Northward as well as northwestward from France the importance of animals increases and the number of crops declines. In the Netherlands and Denmark this does little harm, for the cultivation is so intensive and cooperation so well developed that there is great prosperity. In southern Norway, however, where the cool summers limit the chief crops to oats, barley, potatoes, and hay, the dangers of one-crop agriculture are always present, in spite of relatively large numbers of cattle and sheep. But the Norwegians, unlike the Irish, largely supplement their agriculture by fishing, and by acting as carriers of commerce for other nations. Norway has more shipping tonnage per person than any other country in the world. North of the southern fringe of the country crops cease to be profitable, and the Norwegians rely almost wholly on seafaring occupations or on cattle which they drive back and forth from seacoast to mountains according to the season. Across the Scandinavian peninsula to the east where the mountains shut out part of the oceanic winds and moisture, great forests flourish in the cold but relatively dry parts of Sweden bordering the Gulf of Bothnia. There the people not only cut wood but make it into furniture and other useful forms. Almost everywhere in Scandinavia the houses are made of wood, in strong contrast to the brick and stone of England and central Europe. In the far north the cold; stormy climate makes even lumbering and cattle raising impossible. There the Lapps rely on reindeer, or on fish caught close to the shore.

Returning to northern France and proceeding nearly northeastward toward Berlin and Moscow we at first find little change in agriculture and other forms of primary production. In central Germany most of the crops are like those of northern France except that rye, potatoes, root crops, barley, and swine are of greater importance, while fruit and vegetables decline, as befits the colder winters. Farther east in Poland, a harmful tendency toward one-crop agriculture begins. Around Moscow this is so strong that many a farmer plants only rye and oats with perhaps a small field of flax or potatoes. Animals are relatively much less numerous and varied than farther west, and the fertility of the fields is not well kept up. This tendency toward limited crops is due partly to the long, cold winters and short growing season, but has been much intensified by the communistic system of landholding. For many generations the land has belonged to the villages and not to individuals. The farmer was never sure how long he would hold his land, and so took little pains to improve it. Under the Bolshevist régime this tendency was intensified, for the farmers not only had no ownership in the land, but were not even supposed to own the crops. The one-crop type of agriculture as practiced on the rye farms of middle Russia leads to hard times, poverty, ignorance, and apathy not only because of poor crops, but because the diet is one-sided, lacking the vitamines and other necessary elements provided by fruit and vegetables.

Let us next proceed eastward or a little south of east from the Franco-Belgian center of agriculture. There the change in agriculture is slower than in any other direction, for the climatic change is also slow. Thus southern Germany, western Czecho-Slovakia, and the lowlands of Austria have an intensive type of varied agriculture almost equal to that of northern France. Farther east in Hungary and Rumania the warm continental summers cause corn and grapes to be prominent farm products. In fact so far as variety of products is concerned Hungary outranks northern France. Nevertheless, the care with which agriculture is carried on begins to diminish. Even in Hungary this is manifest in the concentration on cereals. Wheat and corn in nearly equal amounts occupy over half the cropped land, and rye, barley, and oats another quarter. Fruit and vegetables occupy less space than in northern France; there is more waste land, less attention is paid to manuring and fertilization of the soil, less care is given to rotation, and there is a greater tendency for the farmer to cultivate one or two especially profitable crops rather than a great variety. At the same time the total number of domestic animals increases in proportion to the population.

In Rumania and southern Russia these tendencies become much more pronounced. A farm tends to become merely a place where three crops are rotated, wheat or barley, hay, and one other, with almost no trees, few vegetables, and almost no small fruits, aside from grapes. Fields of corn, potatoes, rye, oats, flax, and tobacco are indeed seen here and there, and in the region around Kiev sugar beets are raised in great abundance, but these are not the rule. The proportion of cattle, horses, sheep, and swine increases greatly compared with the number of inhabitants, but because of the relatively low density of the population, the number of animals in a given area is less than in western Europe. The care which the animals receive is much less than farther west. In fact lack of care is evident everywhere; the houses are smaller, less comfortable, and less neatly cared for; and there is much more tendency to leave things lying around at loose ends in the yards and outbuildings than in northern France.

These conditions arise in part from the fact that not only is the climate less healthful there than farther west, but summer droughts and crop failures join with the conditions of land tenure and government in discouraging initiative. Indeed in the wheat region of southeastern Russia, from longitude 35° eastward to the lower Volga, droughts frequently reduce the peasantry to destitution, and bring on the horrors of famines, like those of 1890, 1898, and the terrible days of 1921. In this dry, treeless land flat-roofed houses of adobe are common. Still farther to the southeast, near the Caspian Sea, the increasing dryness gradually causes agriculture to give place to nomadic cattle raising except near the Caucasus Mountains where water is available. In the Balkans, likewise, the proportion of animals compared with men increases enormously. Here, as in every other direction, the final result of the gradual modification of the climate is a tendency toward a full-fledged one-crop type of agriculture and then toward communities which rely on animals rather than plants.

Southeastward, southward, and southwestward from northern France this tendency attains its full results only in the deserts of North Africa. In Europe a distance of a few hundred miles from northern France drives flax, sugar beets, and root forage almost out of the farmer's list of products. In southern France rye, oats, and barley are also scanty; but potatoes are still abundant, corn occupies an important place, vegetables and grapes are raised in profusion, and, olives attain importance. There and in the northern parts of Italy, and to a less extent in Spain, intensive agriculture is still the rule, and the farms are not only beautiful because so well cultivated, but because of the variety of the crops and the abundance of trees. Horses and cattle, however, become less numerous except in the Po Valley; swine lose much of their importance; while sheep and goats are not raised in any such numbers as farther south. Hence, northern Italy has few domestic animals. Farther south, as befits the dry climate, intensive agriculture continues in the well-watered portions such as the western parts of the peninsulas of Iberia, Italy and Greece, and in all other regions where irrigation is feasible. In such regions broad fields of a single crop are often replaced by areas where many kinds of trees grow intermingled with vines or separated by little patches of crops. This type of cultivation betokens less care than where each crop is treated separately, with due thought as to the best conditions of moisture, sun, and soil. In some respects it suggests the haphazard agriculture of the torrid zone where everything is left to chance.

In the drier parts of central and eastern Spain and Italy, and in most of the Balkan Peninsula full fledged one-crop agriculture again appears. Winter wheat and barley are the staples, for they ripen early enough to escape the long summer drought which dries up every green thing that is not irrigated. Sheep, and in the Balkan Peninsula goats, become the chief animals, while in Spain, Greece, and the Balkan countries a certain number of the sheep-keepers become nomadic, at least during the summer. Thus here, as on the other borders of Europe, extreme conditions of climate put an end to intensive and highly varied farming, and lead to one-crop agriculture with its danger of famine and distress, and to cattle or sheep raising with its sparse population and its nomadic and unsocial tendencies.

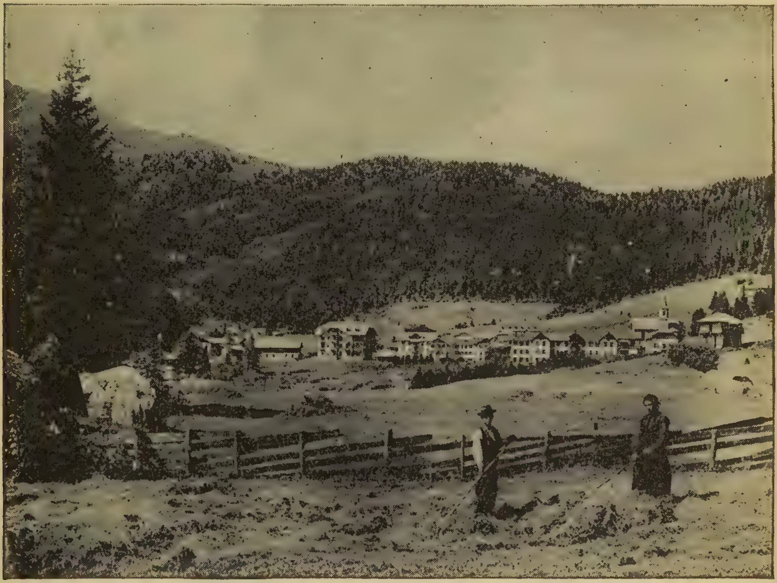

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Fig. 61.—Farming in North Italy.

How Europe's Production and Use of Minerals Vary from Region to Region.—Europe has long been the world's greatest source of mineral wealth. Before the war it produced about 54 per cent of all the coal and 61 per cent of the iron. The United States in a slightly smaller area produced 38 per cent of the coal and 36 per cent of the iron. The war diminished Europe's production, but even now the value of all the minerals produced in Europe is probably nearly three times as great as the production of all the rest of the world aside from the United States.

The coal of Europe, as we have seen, is practically all located along a relatively narrow and much broken strip extending from Ireland to southern Russia. About 95 per cent of Europe's supply or about half the coal mined in the whole world, comes from the part of this strip from Poland westward. Since practically all the coal is mined in the progressive parts of Europe, the methods of extracting it vary little. The chief difference is that machinery is used more in Britain than on the continent and more in the North Sea countries than farther east. But in this respect all parts of Europe are far behind the United States.

In the use of the coal the various parts of Europe differ more than in methods of extracting it. All countries use it for heat and power, but Britain also exports it, while Germany uses it as a raw material for manufacture. Britain, having much coal of high quality, has used it to build up her foreign commerce. Her exports are chiefly manufactured articles of small bulk, while her imports are food and raw materials of large bulk. If there were no other important articles of commerce, many British ships would have to make the outward voyage with very small cargoes, although they would come back fully loaded. But coal furnishes a bulky article which can be used to fill the outbound ships in place of the wheat and cotton carried by the inbound ships. This has been a great advantage in building up trade, although it has the disadvantage of depleting the future reserves of coal.

In Germany an opposite policy has been pursued. The German coal deposits are more limited than those of Britain; in proportion to the population Germany mines only about half as much as her rival. Moreover, the Germans have not needed to import food in any such quantities as the British. Hence, the German policy has been to get as much out of the coal as possible by developing by-products, especially aniline dyes. The stimulus thus given to chemical industries gave Germany an immense advantage in making poisonous gases and explosives during the war. Formerly the United States used coal only as fuel. Now, however, both this country and England are convinced that any country which has so extremely valuable a raw material ought to use it at home for dyes and chemicals.

The European iron ores are well distributed. They have been chiefly developed near the coal deposits in the active North Sea countries and especially in the district of Lorraine on the Franco-German border. Other deposits near the sea, however, in the northern parts of Sweden and Spain are now largely mined for export to the coal of Germany and especially England. Their relation to the coal is like that of the Lake Superior ores to the coal in Pennsylvania. In Europe, as in the United States, there is a growing tendency to load ships with ore in one direction and with coal in the other. Thus iron works have grown up on a large scale in Spain and Sweden, but since two tons of coal are needed to smelt one ton of ore, the main iron works remain near the coal. Sweden also uses the wood of her great forests to make charcoal with which some peculiarly good grades of tool-steel can be prepared.

Of the other mineral products which Europe produces in abundance, petroleum comes from the Caucasus region and Rumania; zinc from Poland with some from Spain and Sardinia; lead from Spain with some from Germany; platinum from the Urals, which furnish over 90 per cent of the world's supply; potash from Germany and Alsace, which were almost the only sources until the war stimulated discoveries in the United States; pyrite from Spain; sulphur from Sicily; and other materials in small amounts from other regions. Although the southern peninsulas, the Urals, the Caucasus, and the mountains on the borders of southern Germany are the only parts of Europe that are even moderately mineralized, except with coal, the few resources are so well utilized that the continent produces more than 30 per cent of the world's coal, iron, lead, zinc, platinum, tungsten, potash, pyrite, sulphur, mercury, bauxite, graphite, magnesite, salt, stone, clay products, cement, and slate.

Two of Europe's most critical political problems center around coal. In the Saar Basin on the eastern border of France the Versailles Treaty of 1919 gave France the right to the coal and provides that at the end of fifteen years the district is to decide by vote whether it wishes to be part of France or Germany, or to remain under the control of the League of Nations. In upper Silesia at the southeastern corner of Germany a small tract containing coal was in dispute between Germany and Poland at the end of the war. A plebiscite showed that parts were prevailingly German, especially the industrial parts, while other parts, chiefly rural, were Polish. The League of Nations finally decided on a division, but neither in Silesia nor the Saar region is either of the claimants thoroughly satisfied. Coal is so valuable that where there is any doubt as to what nation has the rightful claim, the situation may be serious.

How Manufacturing is Distributed in Europe.—The general distribution of manufacturing in Europe, Fig. 54, is much like that of health (Fig. 58) and general progress (Fig. 59), but it is also strongly influenced by the distribution of coal. Hence, the darkest shading in Fig. 54 extends from Scotland through England, northern France and Belgium to southern and eastern Germany. It also includes Switzerland, for to some extent Swiss water power takes the place of coal. The relatively progressive agricultural countries of Norway, Sweden, Denmark, Ireland, southern France, Italy, Austria, and Poland, fall in a group where manufacturing is moderately developed, while in the rest of Europe the amount is limited.

The types of manufacturing in Europe vary from the most complex to the most primitive. Where more than 30 per cent of the workers are engaged in manufacturing, the complex type predominates, highly varied raw materials are brought from a distance, and the completed products demand a relatively large amount of work and skill. In such regions the food of the cities is usually brought from a distance, either from overseas as in Britain, Belgium and western Germany, or from other portions of the same country as in much of Germany and France.

In the regions where from 10 to 30 per cent of the workers are engaged in manufacturing, the simple type prevails. The products include such articles as the butter and bacon of Denmark, the olive oil of Italy, the peanut oil of Marseilles, the wines of southern France, and the linen thread of Ireland. Of course complex manufacturing is more or less mixed with the simple type, but we are speaking of the kind that is most abundant. Where the percentage of workers engaged in manufacturing falls below 10, as in eastern Europe and some of the southern parts, there is practically no complex industry whatever. A small amount of simple manufacturing such as the pig iron of southern Russia, the Urals, and Spain, and the wood pulp and lumber of Sweden, is mixed with more or less of the primitive type such as the crude tanning of hides by nomads in southeastern Russia, the weaving of homespun cloth in Bulgaria and the spinning of woolen thread by the shepherds of Greece.

How Manufacturing Varies in the Regions where it is Most Advanced.—In studying each of the continents the distribution of manufacturing in general (Fig. 54) must not be confused with that of special industries. The general distribution depends first upon race and climate, and then upon coal and other sources of power. The distribution of special industries within the general areas of manufacturing depends on many factors including (1) the accident of the original location of an industry, (2) raw materials, (3) transportation, (4) markets, (5) government policy, and (6) other conditions both geographic and economic. For example, in Britain the cotton industry is located almost entirely in Lancashire west of the Pennine Range. This is partly because American cotton, which was long the only available supply, enters England through Liverpool, and partly because the moist west winds on the windward side of the country give the dampness which is needed to prevent the thread from roughening and hence breaking. The woolen centers, on the other hand, are located east of the Pennine Chain. Long ago when no wool was imported, one of the best and largest supplies was grown in the Pennine upland and the shepherds found it easier to come down to Yorkshire than to Lancaster.

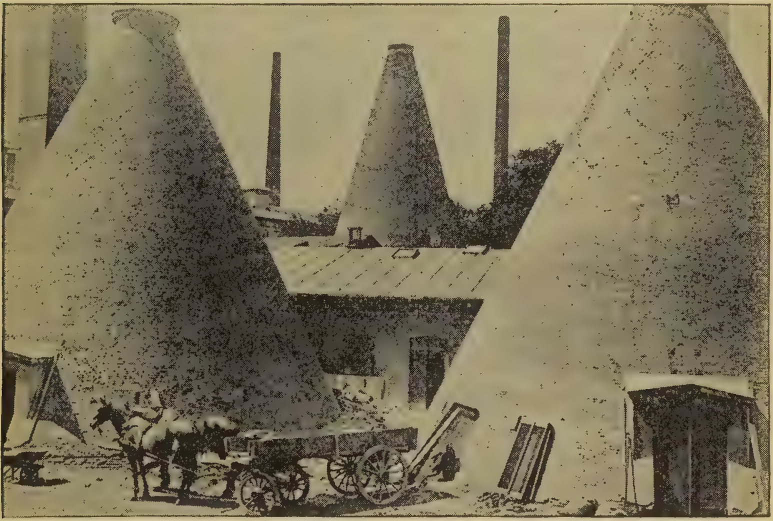

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Fig. 62.—The Porcelain Industry in Copenhagen.

Shipbuilding in Britain centers at Glasgow on the Clyde, where iron, coal, skilled labor, and a protected harbor are all available. The making of steel goods, especially the bulky kinds such as rails, centers in places like Birmingham close to coal and not far from iron. On the other hand, the huge clothing industry is concentrated at London, because that city provides far the greatest market and the largest supply of cheap labor, and is the place where merchants from the rest of the country prefer to buy.

Other countries show the same localization of industries for similar reasons. The German iron and chemical industry centers on the western coal fields where such cities as Essen and Duisburg have grown up. Dresden specializes in pottery and art goods because she has good supplies of clay and has attracted workmen with artistic ability. Paris is the world's great center of highly finished ornamental goods, delicate dress fabrics, and other goods that appeal to the esthetic sense. There seems to be no physical reason for this. It apparently arose from the artistic character of the early Parisians and the fact that formerly the presence of rich monarchs drew skillful workers to the city, while now the fame of Paris attracts people of artistic temperament. Every art student who goes to Paris helps to strengthen the city's position as a center of good taste. The industrial history of Paris well illustrates the fact that when an industry is thoroughly established it tends to perpetuate itself in the same place, especially if it requires high skill. The same condition is evident on a smaller scale in the silk manufactures of Lyons, and the watches, laces, and other fine goods of Switzerland.

How Manufacturing Influences European Progress.—The growth of manufacturing has a profound influence upon the distribution of many factors that influence human progress. (1) The most obvious effect is to cause great density of population; as appears from a comparison of the European parts of Figs. 31 and 54. If the data on which the manufacturing map is constructed were as full as those for the map of density of population the resemblance would probably be greater. The distribution of population, however, is by no means entirely due to manufacturing. In 1700, when all manufacturing was largely primitive, the general distribution of the relatively sparse population was much the same as today, but there was no such density as now.

(2) What manufacturing chiefly does is to foster the rapid development of large cities. How true this is may be judged from Table 5, which shows the percentage of the European population living in cities of over 50,000 people before the Great War. In England, about 48 per cent of the inhabitants live in such cities, in Serbia and Rumania where there is little manufacturing only 3 to 4 per cent.

(3) Where such concentration occurs, people's chances to get an education, and to study art, literature, music, and science are much increased. In the large manufacturing cities of western Europe the ambitious workman can get almost any kind of training. Free schools, social settlements, public museums, and many lectures, concerts, and institutions of higher learning are open to him. Vocational training is a modern innovation whose distribution depends largely on manufacturing, for modern industry demands a great amount of technical

skill and the concentration of population brings together large groups who need the same training. In England vocational education is directed especially toward mechanical and engineering problems; in Germany, where it is highly developed, the chemical industries receive special emphasis.

(4) Another condition whose distribution is greatly influenced by manufacturing is the opportunity to rise from one social grade to another. In the rural districts of Europe the son of humble parents is expected to be more or less like his parents. In the great business enterprises of the cities each man or woman is rated more nearly according to his own achievements and character, and is advanced accordingly. Thus manufacturing, together with the commerce which accompanies it, has been one of the strongest factors in breaking down the old class distinctions all over western Europe and especially in England.

The Bad Effects of Concentration in Industrial Cities.—The bad effects, like the good effects of manufacturing, are very evident in Britain, Belgium, and Germany, less conspicuous in France, Italy, Denmark, and Sweden; and scarcely noticeable in Bulgaria and eastern Russia.

(1) One bad effect is the high deathrate of cities. Other things being equal, the great congested cities with their huge buildings and small space for living kill people off much faster than the rural or suburban districts where there is plenty of pure air, sunlight, space, grass, and trees. Only through enormous expenditures for pure water, sanitation, hospitals, medical service, and vacations, can the urban deathrate be kept down.

(2) The growth and congestion of cities under the influence of manufacturing cause them to become centers of evil as well as of opportunity. Almost nowhere else are the slums so terrible, the poverty so dire, as in the great manufacturing cities. London's slums are among the worst places on earth. The cities of eastern Russia and Greece rarely see either wealth or poverty, squalor or splendor, misery or success like those of London, Liverpool, Glasgow, Paris, Berlin, and many other manufacturing cities. Fig. 54 showing the distribution of manufacturing might almost be labeled "Distribution of Extremes of Poverty and Wealth." This tendency has been greatly increased in recent decades by automatic machinery which is not only labor-*saving* but labor-*stupefying*. A machine that can perform scores of operations with almost human skill is indeed a great triumph of human invention. But to sit for hours before such a machine doing nothing except tie threads, for example, or shove in bits of metal, is so monotonous that it often drives people to seek harmful excitement and pleasure

or else makes them hopelessly dull. Shorter hours and opportunities for recreation have become common in western Europe largely on this account, but factory work still tends to deaden the abilities of millions of people in the great cities. A few, of course, who do the more interesting and skillful work are benefited, but the stimulus which comes to them by no means balances the harm that comes to the others.

(3) Such conditions give the manufacturing communities of western Europe a series of problems wholly different from those of the commercial and agricultural sections. Strikes, labor reforms, the movement for short hours, plans for community recreation and instruction, and the movement to induce city workers to move into the suburbs and have their own homes and gardens are only a few of the many activities that center in the great industrial cities. Such movements are most active in the great British cities, but are also prominent in the continental manufacturing cities. Sometimes they take special forms such as the old age pensions of Germany. Outside the areas of intensive manufacturing, however, they diminish greatly in importance. A map of manufacturing in Europe is almost a map of movements for social betterment.

(4) Another dangerous condition, which is due to many causes but which is most noteworthy in the manufacturing regions, is the decline in the size of the families of the more competent parts of the community. The scarcity of children in France and Ireland, to be sure, indicates the great importance of other causes beside modern industry and its accompanying high standards of living and love of extravagance. On the whole, however, the area of few children extends from Scotland to Switzerland with a bulge eastward in Germany just as does the area of intensive manufacturing. Of course small families are not in themselves a danger, especially if they prevent a country from lowering its standards of living. The danger lies in the fact that the competent families and the competent nations have few children, while the incompetent have many. Hence in the next generation, when the growing complexity of civilization will demand more people of high ability than ever before, there may be less than ever in proportion to the total population. In almost no occupation is the need for men of unusual ability increasing more rapidly than in business.

How this applies to the countries of Europe is shown in the excess of births over deaths. In France even before the Great War the births each year among every 1000 people exceeded the deaths by only 0.9. Since the births are more numerous among the incompetent classes than among the people with thrift and ability, France was actually losing in the number of people competent to carry on business. In the other manufacturing portions of western Europe and also in Spain and Ireland the excess of births over deaths was less than 12 per thousand inhabitants. Even if the competent people were not diminishing in number, they were not increasing as rapidly as the rest of the population. Only in the Netherlands, the great commercial country of western Europe, was there an excess of births (15.2) comparable to that of the less progressive regions of Portugal (14.1), the Balkans (14.5 to 18.6), and Russia (16.7). In other words, the tendency before the Great War, and also now wherever things have gone back nearly to normal, is not only for the weakest elements in each nation to increase most rapidly, but for the weakest nations to increase much more rapidly than those that are more competent. If the tendencies shown before the war should persist 100 years the descendants of 1000 people would number only 1094 in France, compared with about 6200 in Bulgaria. In a hundred years if the recent rate of increase should continue, which is not probable, Rumania would have about 45 million inhabitants, or more than France would then have, while Russia would have nearly 500 million, or more than all Europe at present.

Because of the rapid increase of population in northern, southern, and especially eastern Europe previous to the war, the backward nations were gradually invading and displacing those that are more advanced. For example, Asiatics were gradually pressing into Russia; Russians were moving westward; Germany was being invaded by Poles; while Germans moved westward into France, Britain, and across the seas. In 1913 there lived in Germany 919,000 Europeans from countries standing lower than Germany in the scale of civilization as described in an earlier chapter, and 317,000 from countries standing as high or higher. The same displacement of people with high standards of living by those with low standards is taking place in all manufacturing countries—in the United States most of all. Formerly, when people supposed that mere numbers were an index of strength, this condition was regarded as an advantage. Now that the importance of quality rather than quantity is realized, Germany, France, and Great Britain, like the United States, are wondering what they ought to do to insure a strong mental as well as physical inheritance to future generations.

Transportation in Europe.—The geographical distribution of facilities for transportation in Europe is much like that of other activities. The facilities are best near the North Sea, and decline more or less regularly in all directions. The conditions that lead to a well-developed transportation system include: (1) an active, intelligent, and prosperous population, (2) gentle relief, (3) an extensive and well indented seacoast, and (4) an abundance of inland waterways. Such a system comprises:

(1) roads for local traffic, (2) trolley and tram lines for urban and suburban intercourse and especially for people going to work, (3) railways for fast traffic over long distances, (4) inland waterways for slow, cheap, heavy traffic, and (5) harbors and ships for traffic with other countries.

Among the countries of the world only a few surpass the Netherlands in conditions that favor transportation, or have a finer transportation system or a greater commerce in proportion to the population.

Keystone View Company.

Fig. 63.—On the Docks at Bordeaux.

Its 2100 miles of railway give the Netherlands a larger mileage in proportion to its area (169 miles per 1000 square miles of area) than that of any country in the world except England, Belgium, Switzerland, Germany, and Italy, although parts of countries, for example, Massachusetts, surpass it. In addition, the Netherlands has a nearly equal length of canals (2000 miles), and of light railways (1700 miles) corresponding to our trolley lines, and about 1150 miles of river waterways on the Rhine, Maas, Scheldt, and their tributaries. In addition it has a fine system of highways including about 3000 miles of state road. How it compares with other countries may be judged from the following table:

LENGTH OF LINES OF TRANSPORTATION PER 1000 SQUARE MILES OF AREA *

Form of Transportation.	Netherlands.	Belgium.	England.	Germany.	Scotland.	Ireland.	Bulgaria.	Massachusetts.
Railways	169	257	282	182	130	105	34	265
Light railways	137	222	38	47	10	5	0	397
Inland waterways	250	109	63	41	6	26	7	2
Total	553	588	383	270	146	136	41	664

LENGTH OF LINES OF TRANSPORTATION PER 10,000 POPULATION

Form of Transportation.	Netherlands.	Belgium.	England.	Germany.	Scotland.	Ireland.	Bulgaria.	Massachusetts.
Railways	3.1	3.8	4.6	5.6	8.2	7.8	3.1	5.8
Light railways	2.8	3.3	6.1	1.5	0.6	0.4	0.0	8.7
Inland waterways	5.1	1.6	1.0	1.3	0.4	1.8	0.6	0.1
Total	11.0	8.7	11.7	8.4	9.2	10.0	3.7	14.6

In total mileage of transportation lines in proportion to the respective areas the Netherlands is surpassed by Massachusetts and very slightly by Belgium. In proportion to the population the Netherlands is well ahead of Belgium, while the fact that waterways furnish a cheaper means of communication than landways would make it almost as well off as Massachusetts, which leads the United States in facilities for transportation, were it not for the far greater abundance of motor vehicles in the United States than in Europe.

The first and more important part of the preceding table illustrates the decline in transportation as one proceeds away from the Netherlands and Belgium. Toward the northwest, although England excels even Massachusetts in ordinary railways, it falls far behind the Low Countries in light street railways and in waterways. Scotland and Ireland both fall much lower. It should be noted, however, that in proportion to the population the transportation systems of the Netherlands and England are practically equal, while those of Ireland and Scotland both rank high. Toward the east (in Germany) all kinds of transportation fall behind Belgium and the Netherlands, although this is true chiefly of the eastern portions and not of the west where conditions resemble those in the Low Countries. Farther east in Bulgaria, the railroads become of slight importance, there are practically no light railways, and the Danube is the only important waterway.

In other directions there is the same decline in transportation as

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* This table does not quite agree with those in Part V because data for light railways are not available for the same year in all cases.

one proceeds away from the Netherlands. In spite of local differences, waterways rapidly cease to be of importance, light railways such as our trolley lines almost disappear, while railways become scanty, although the change in them is not so rapid. The diminution in these types of transportation is accompanied by a decline in the character of the roads; and wagons take the place of motor vehicles. In large parts of such countries as southern Spain, Sicily, Albania, and southeastern Russia, the roads degenerate into mere trails, and both freight and passengers are often carried on the backs of horses and asses. Northward the same transition is apparent, for in northern Norway carts give place to pack animals, and the Lapps carry their goods over faint trails upon the backs of reindeer, or in sledges over the snow.

The Distribution of Trade and Commerce.—Our discussion of other types of activity, especially transportation, has already indicated how European trade and commerce are distributed. Unfortunately statistics as to domestic trade are not available, while those for foreign commerce, as was pointed out in Chapter VII, create a wrong impression because small countries show a greater per capita trade than large countries of equal activity. Nevertheless, it is worth while to study Fig. 30 showing the per capita foreign commerce of different parts of Europe. In a general way it resembles the maps of transportation, manufacturing, and health. It is difficult to say whether commerce causes the development of transportation facilities, or whether the facilities cause commerce. When active people wish to carry on commerce, they improve the transportation facilities, and take advantage of easily traversed plains, low passes in the mountains, and rivers that can be made navigable. But as soon as a road, a railway, a canal, or a harbor is built or improved, it at once stimulates commerce and that creates a demand for still better means of transportation. In the last analysis both transportation systems and commerce are results of human activity. In Switzerland, for example, the construction of railways is more difficult than in almost any other country of Europe, but Switzerland has more railways per square mile than any other countries except England and Belgium, and four of its tunnels through the Alps are among the masterpieces of engineering. The reason is that the Swiss are highly capable and their rough country lies between the active people of France, Germany, and the North Sea regions on the one side, and the active people of North Italy and the whole rich Mediterranean region on the other side. Hence railway construction has been about a hundred times as active both in proportion to the area and to the population as in the level and easily traversed plains of southeastern and northeastern Russia.

Another illustration of the way in which the people count for more than the natural resources is shown in the value of Russia's pre-war trade with a million people in each of the other countries of Europe. Germany and Austria have a large Russian trade because they are Russia's near neighbors. But Rumania, Bulgaria, Greece, and old Turkey stand low even though they are near neighbors and are reached by easy ocean transport. They are much exceeded not only by Denmark, England, Belgium, and the Netherlands, which have easy oceanic connection with Russia, but also by landlocked Switzerland. This means that the impulse toward trade comes largely from the active countries. They want the wheat, flax, manganese, petroleum, wood, and other products which Russia can furnish. They also want to sell their cloth, knives, machines, and manufactured ornaments. Hence they start trade and keep it up, by educating the less active people to want the goods that are brought them and to produce the things that the manufacturers want. If this great principle is grasped it helps to explain the commerce of any two countries no matter where they may be located. The exact details of the articles that pass between the two can be remembered only by the specialist, but the general nature of the commerce can be known by everyone.

EXERCISES AND PROBLEMS

1. How far do statistics bear out the statements of the text in regard to the changes in agriculture as one travels from the Franco-Belgian center? Answer this by making tables of the following form based on Tables 13 and 15.

AVERAGE PRODUCTION PER ACRE

Country.	Wheat.	Potatoes.	Corn.	Barley.	Oats.	Tobacco.

2. Compare the distribution of agriculture and of cities in Europe. Prepare isopleth maps based on Tables 7 and 5. Explain the resemblances and differences.

3. Study the countries used in Exercise 1 and determine whether the countries which stand low in agriculture stand high in manufacturing and mining. Tabulate the countries according to their rank in (*A*) the chief minerals, Table 25; (*B*) the number of cotton spindles, Table 30. On what factors does the distribution of mining depend? What correlation is there, if any, between the distribution of cotton manufacturing and any special geographic factors?

4. From Table 39 using the columns of Imports per capita and Exports per capita again study the countries of Exercise 1 and arrange them in order of importance in regard to commerce. Is the order in this case related in any way to the previous tabulations? Compare carefully and account for any discrepancy.

5. Select some product (vegetable, animal, or mineral) and study its occurrence in the various parts of Europe. Begin as usual by preparing tables and maps on the basis of all the information you can get in this book and elsewhere. Then read up

on the product, and finally write an account of its distribution, its variations from place to place, the extent to which its production varies because of varying geographical and human conditions, and the degree to which it influences man's activities. Give causes wherever possible.

6. Make a careful study of one of the following European subjects: (*A*) the distribution of manufacturing; (*B*) the transportation system; (*C*) foreign commerce; (*D*) colonial possessions; (*E*) finances. Let your study center around the problem of *distribution* and of the reasons for the differences between one part of the continent and another. Begin by preparing tables and maps from the data in this book and from the Statesman's Yearbook. Use other reference books, but base your work primarily on statistics and maps. The method used in Exercise 1 will help you.

7. Make an intensive study of business conditions in some European country. (*A*) Prepare a table showing its conditions compared with those in the United States, on the basis of Tables 1, 4, 7, 9, 11, 12, 13, 14, 15, 25, 30, 33, 34, 38, 39, 40, and 45. If your country fails to appear in any of these tables ascertain its approximate condition and the probable reason for its omission. (*B*) Get as much information as possible from the Statesman's Yearbook, the encyclopedia, geographical textbooks, and other sources, and prepare other tables, especially on manufacturing, transportation, and commerce. (*C*) Write a report setting forth the most important facts which ought to be known by a business man who expects to have dealings with your country. Illustrate it with tables, diagrams, and maps. (*D*) Present the gist of your report to the class in a five-minute talk.

8. Prepare a report on some special activity or type of business in Europe such as textile manufactures, iron and steel products, use of motor transportation, canals, and coastwise traffic, lumber supply, potato culture, stock raising, aluminum production, relative financial strength of countries, their artistic preferences. Hundreds of such topics are treated in newspapers, magazines, and books. In each case try to determine the relative importance of your topic compared with others. Illustrate your report with maps. Give statistics if possible. Where none are available give approximate data, but carefully distinguish between these and exact data such as appear in the tables of this book. In all cases compare Europe with the U. S. and compare individual countries with your own state. Remember that your work will not be fully successful unless you show how your special topic is related to the various factors of geographic environment.

9. Study the relative capacity of European countries as indicated by psychological tests of foreign-born recruits in the United States Army during the Great War. The percentages of foreign-born recruits in the three higher mental grades (*A*, very superior; *B*, superior; and *C*, average) were as follows:

1. England	91.3
2. Holland	90.2
3. Denmark	86.6
4. Scotland	86.4
5. Germany	85.0
6. Sweden	80.6
7. Belgium	76.2
8. Norway	74.4
9. Old Austria-Hungary	62.5
10. Ireland	60.6
11. Turkey (Armenians, etc.)	58.0
12. Greece	56.4
13. Russia	39.6
14. Italy	36.6
15. Poland	30.1

From these figures construct a shaded map of Europe with isopleths at 80, 60, and 40. How far does your map resemble the maps in Chapter XVII? What inferences do you draw from this as to the conditions of business? To what extent does this exercise help you to determine how much of the relative progress of different parts of Europe is due to race, how much to geographic environment, and how much to education, government, religion, and so forth?

CHAPTER XIX

ASIA: THE CONTINENT OF DIVERSITY

The Interplay between Asia and Europe.—Since the dawn of history the people of Asia have again and again invaded Europe, while the Europeans have advanced into Asia. The broad-headed Alpine and other people of central and eastern Europe—the Slavs, Huns, Magyars, and Turks—are derived from Asia's later overflow. The conquests of Alexander, the Asiatic expansion of Rome, the Crusades, and the present domination of large parts of Asia by Europeans represent the reverse movement from Europe. Each outward migration from Asia has permanently influenced the trend of civilization in Europe; but in the past the European conquerors of Asia have disappeared or been absorbed without producing any marked effect. Today the interplay between the outward tendency of Asiatic migrants and the tendency of Europeans to dominate Asia but not settle there, is one of the main factors in the world's political and business relations. Chinese and Japanese migration to America, a " white " Australia, Hindu coolie labor in South Africa and South America, and colonial troops in the Great War are all phases of this problem. So, too, are Asiatic colonies and mandates, the control of raw materials and food supplies, the " open door " policy in the Far East, and the building of railways in China, Siberia, India, and elsewhere.

Asia's Disadvantages in Size, Shape, and Position.—The contrasted tendencies of Asia and Europe depend largely on their geography.

(1) Asia's great size and peculiar topography make the interior very dry, and permit great extremes of temperature. This causes widespread barrenness and poverty. The size also fosters isolation and backwardness because communication by land is more difficult than by water. Scarcely 5 per cent of Europe is more than 600 miles from the sea, compared with about 35 per cent of Asia, or one and one-half times the area of Europe.

(2) The *shape* of Asia is also a disadvantage. Europe and Asia have an interesting resemblance like that of the right and left hands. Thus (*a*) Asia Minor corresponds roughly to the upper Balkan peninsula ending in Constantinople; (*b*) Arabia corresponds to Greece; (*c*)

India to Italy; (*d*) the Malay and Indo-Chinese peninsula to that of Spain and Portugal; (*e*) Korea to Brittany; (*f*) Japan to Britain; (*g*) the Japanese Sea to the North Sea; (*h*) the Sea of Okhotsk to the Baltic; and (*i*) the Kamchatkan peninsula to Scandinavia. But the Asiatic gulfs and seas penetrate inland far less than those of Europe. Moreover, the most important coast faces east in Asia and west in Europe, so that the prevailing westerlies of the most favorable latitudes do not appreciably modify the severity of the Asiatic climate. Another reason for the contrast between the continents is that Europe is a peninsula of Asia. When the severe climate of inner Asia or any other of the many possible causes drives people outward, they migrate into the peninsulas. Hence, Europe has a great mixture of races. The various branches of the Nordics, Mediterraneans, and Alpines owe much of their present distribution to pressure from Asia. The repeated droughts in inner Asia, the scarcity of food, and the increase of population seem to have been among the reasons for the barbarian migrations of earlier times.

(3) Again Asia's position is not so good as that of Europe. About two-fifths of Asia lie in the unfavorable latitudes north of 60° or south of 30°, while only about a fourth of Europe lies north of 60° and none south of 30°. Moreover, although the island groups of Britain and Japan both face America, Japan is over twice as far from America as is Britain, and faces the portion where the rugged relief, the relatively dry climate, and the newness of the country restrict the population.

The Great Disadvantages of Asia's Relief.—In relief Asia is strongly at a disadvantage compared with Europe. This is primarily due to the vast central mountain system, comprising Asia Minor, the Caucasus, Elburz and Hindu Kush mountains, and the great mass of highlands bordered by the Himalayas and the Burmese ranges on the south and the Tian Shan, Altai, and Stanovoi ranges on the north. On a good relief map notice how the mountains of both Europe and Asia form loops enclosing plains, plateaus, or basins. In Europe the loops of the Po, Hungary, and Rumania, swing around low areas with easy access to the sea or to other plains. Only in the far west does Spain contain an elevated plateau practically surrounded by mountains. In Asia all the loops are of the unfavorable Spanish type, and are of vast size comprising about six million square miles. For example, Asia Minor is a high, sparsely populated, mountain-girt plateau accessible from the sea only by way of steep narrow valleys. Farther east the mountains contract into the knot of the Armenian Highland where Ararat rises 17,000 feet. Then comes another and greater loop, the elevated basin or plateau of Iran where a million square miles in Persia, Afghanistan, and Baluchistan are almost completely cut off from the ocean, and can support only ten or twenty people per square mile. Next, in the mighty knot of the Pamirs north of India, great mountains rise from a huge plateau ten to fifteen thousand feet above the sea. Farther east a series of mountain chains extend from the Pamirs to Behring Strait, another series stretches from the Pamirs to the northern tip of Siam, while a third running from northern Siam to the Sea of Okhotsk lies from 200 to 700 miles from the Pacific coast. These three sets of mountains enclose an area larger than Europe and almost completely cut off from the ocean. So dry, high, or inaccessible is it that Tibet, Chinese Turkestan, Mongolia, and Transbaikalian Siberia contain little more than one inhabitant for each of the four million square miles. Yet these regions occupy the best latitudes, 30°–50° N., and correspond to the United States from the Appalachians westward to the Rockies.

The vast mountain mass extending from Asia Minor to the Pacific also harms Asia by almost completely separating the north from the south. Mountainous projections in Persia and Indo-China divide the southern section into three isolated regions centering in Mesopotamia, the Indo-Gangetic plain, and the plains of China. Today no railroad crosses the mountains from north to south, or penetrates from one of the three southern regions to the other. The only place where a railroad can easily cross from north to south is eastern Persia and western Afghanistan. This route where railroads from India and Asiatic Russia now almost meet corresponds quite closely with the gap in the European mountains along the Rhone Valley. But in Asia nearly two thousand miles of desert separate the productive regions of the Caucasus and the Indus delta, while the European railway everywhere runs through a land of dense population and wonderful possibilities. Great cities like Lyons and Marseilles in Europe correspond to little mud towns like Merv and Herat in Asia.

Railway connection between the east and the west of Asia is almost as limited as between the north and south. Only in the far northeast does the Siberian railway cross the northern wing of the great central mountains. There, too, vast barren tracts must be traversed. For a thousand miles between the fairly prosperous Irkutsk region and the fertile part of Manchuria, the Trans-Baikal region is so cold that there is almost no population. Chita, with its 80,000 people and its log huts, occupies a position on this line comparable to that of stately Vienna which guards the passage of the mountains on a similar line in Europe.

The plains of Asia, although of vast size, are for the most part much less desirable than those of Europe. In the huge Siberian plain the

Ob, Yenesei, and Lena river systems would provide fine inland waterways, were it not that their northward direction largely destroys their value, while the low temperature greatly restricts the population. The southern plains in Arabia and India are much handicapped by being either too dry or too warm.

The other main features of the relief of Asia are the plains of the eastern coast from Manchuria to Indo-China, and the mountainous island fringe from Sakhalin and Japan to Sumatra and Ceylon. The plains, though fertile, are small compared with those of Europe, the United States and South America, and the islands are extremely rugged. In general the relief of Asia hampers human progress because it divides the continent into a number of diverse sections instead of drawing a large part toward a center as in Europe, and because the most favorable relief is located where the climate is unfavorable.

The Great Climatic Extremes of Asia.—The size, shape, position, and relief of Asia all combine to produce climatic extremes and contrasts. Fully half of the continent has a winter climate colder than that of any part except the mere northern fringe of the inhabited parts of North America. This is a serious deterrent not only to agriculture, but to human health and efficiency. The summers, however, even in this northern half are warm. Near the Arctic Circle the maximum temperature is sometimes 85° F. In Yakutsk, in latitude 62° N., the July average is 66° F., or as high as on the northwestern coast of Spain, 20° farther south. The period of active plant growth, however, lasts only three months instead of eight. Farther south, the summer temperature is usually extreme. At Tashkend, for example, in the latitude of New York, it averages over 80° in July, and remains above 74° for three months. Aside from limited areas at high levels in relatively low latitudes, almost all parts of Asia suffer at some season from prolonged and harmful extremes of cold or heat.

Northern Asia gets some rain from local showers in summer and some from cyclonic storms. North of latitude 52°, the coolness of the summers causes a small rainfall to suffice for forests and agriculture. Asia, however, has relatively few cyclonic storms like those of the United States and Europe. In fact, Japan is the only Asiatic region that can compare with Europe in number of storms and hence in the stimulating quality of its changes of temperature, humidity, and sunshine. In the latitudes which in Europe are most favorable, that is, from about 45° to 52°, the summers are so warm and dry that the region east of the Ural river and north of the Sea of Aral and Lake Balkash forms a steppe or grassland, good for horses, sheep, and camels, but generally too dry for crops.

Farther south a vast desert belt, 50 per cent larger than Europe, extends from Aden in Arabia and Aleppo in Syria almost to Peking in China and Harbin in Manchuria. Certain areas like Russian Turkestan have well watered and fertile valleys that support a fairly dense population, but they form a small percentage of the whole. This desert belt, extending across Asia from the Red Sea almost to the Pacific Ocean, intensifies the effect of the mountains in separating northern and southern Asia. It limits the natural resources by discouraging vegetation; moreover, the extreme dryness, the monotony from day to day, and the enforced nomadic life of many of the people retard the development of even the scanty resources that are available. The distress and wars arising from periodic dryness within this belt are generally supposed to be among the chief reasons why the people of central Asia have migrated outward so often.

On the western margin of the Asiatic deserts, Syria, Asia Minor, Armenia, and northwestern Persia belong to the same subtropical or Mediterranean climatic province as Sicily and Greece. Fairly abundant rain in winter, but almost none for five or six months in summer gives them the disadvantages of one-crop agriculture, a relatively sparse population, and dependence in large measure on animals. Here, more than in almost any other part of the world, innumerable dry ruins appear to indicate that one of the prolonged climatic pulsations to which the earth is subject is now causing this particular region to have fewer storms, less rainfall, a less stimulating climate, and more malaria and other diseases than two or three thousand years ago.

South and east of the Asiatic deserts the rainfall of India, Indo-China, China, and Manchuria displays a marked contrast to that of the southwestern countries. The dry winters and wet summers of the south and east are exactly the reverse of the dry summers and wet winters of the southwest. The dry southeastern winters are due to monsoon winds blowing out from the high pressure area of the Asiatic interior; the wet summers to inblowing monsoon winds caused by low pressure in the interior. The summer winds come from relatively warm seas and are forced to rise over high mountains. The rainfall which they bring is one of the chief causes of the dense population and remarkable development of agriculture in southeastern Asia.

Business Relations of Northern Asia.—The climate of Asia and the relief and other geographical conditions have a profound effect on the character of the people and on their relation to the world's business. In the north beyond the Arctic Circle the cold Tundra belt with its scanty vegetation is so devoid of natural resources and of inhabitants that it is commercially and industrially negligible. Next comes the great forest belt of Siberia, lying chiefly between latitudes 55° and 65°, but descending to latitude 50° near Lake Baikal and 40° near Vladivostok. This is sometimes spoken of as the world's greatest timber reserve outside the torrid zone. In area it is indeed the greatest, but not in quality or in capacity to furnish a steady supply. The trouble is the climate. The extremely long, cold winters, and in some places the light rainfall cause many of the trees which are chiefly conifers, to be relatively small and stunted. The *taiga*, as the low swampy forests are called, makes good paper pulp but not good merchantable timber. Moreover, the trees do not grow especially fast, so that their speed of replacement is only a fraction of that in regions like western Oregon where the conifers live under almost optimum conditions. Doubtless many lumbering communities will some day be scattered through the Siberian forest, but they are likely to be crude and migratory. In the highlands of eastern Siberia gold is abundant and other metals may give rise to mining towns. But these are scarcely better than lumber camps as promoters of civilization.

Why the Agricultural Belt of Siberia has Little Trade with America.—On the southwest the forests merge into the Siberian agricultural belt which is traversed by the Siberian railway. This belt has been the basis of rosy but doubtful prophecies that Siberia is the white man's land of the future; that it will some day rival the United States. The deep-soiled plain is climatically one of the best parts of Asia and is fairly well adapted to the white man. It produces a moderate abundance of wheat, oats, barley, and hemp, and of horses, cattle, sheep, and swine. It also has a supply of fairly good coal west of Lake Baikal. But these advantages are largely offset by certain disadvantages. First, the belt is more limited than is generally supposed. It has a width of scarcely 500 miles and extends eastward from the Urals only

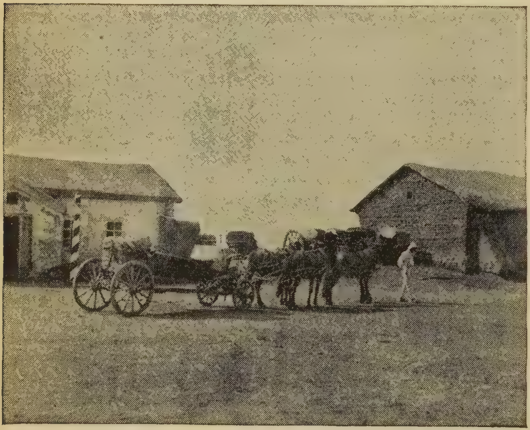


FIG. 64.—Post Wagon in Siberia at a Station near Omsk.

Siberia still maintains the world's most extensive system of post roads.

about 2000 miles; that is, its total area is about a million square miles or a third of that of the United States. Northward and also eastward in the plateaus beyond Lake Baikal the climate is too cold for profitable and extensive agriculture, while southward it is too dry. Even in the belt itself the agricultural possibilities are limited by the cold.

In the second place, the facilities for transportation are poor. The plain and the rivers indeed appear favorable, but the rivers are frozen about half the year and empty into the Arctic Ocean. The plain is often only half covered with snow in winter so that neither runners nor wheels can be used, and it is hopelessly muddy in spring when the snow melts. Worse than this is the great distance to markets. The agricultural belt of Siberia is adapted only to raising a few food products, and the nearest large manufacturing region which must bring food from a distance in great quantities is Germany, over 2000 miles from the central region near Tomsk, Omsk, and Barnaul. For that reason the more progressive Siberians have taken to raising dairy products, for butter and cheese can stand long transportation because of their high value in proportion to their bulk.

Unfortunately the people of Siberia are not particularly active in business. The explorer, Nansen, like many others, speaks again and again of the apathy of the Siberians, their tendency to sit still and do nothing. Russian exiles in the days of the Czars repeatedly went to Siberia full of plans for study, self-improvement, and writing, but almost invariably, especially in the east where the climate is most severe, they gradually fell into apathy. Doubtless this was due partly to the isolation, but the long, severe winters when the tight houses are as hot and dry as deserts, and when there is nothing to do out of doors, probably have much to do with it. At such times the exertion required to keep warm out of doors creates a reaction which produces lethargy indoors. Moreover, for many months there is almost no work that people can do. They sit in the house and acquire the habit of idleness. Even in the south at Semipalatinsk seven months are colder than the coolest month in London, while at Tomsk, April is colder than January in New York. The result of all these conditions is that from the standpoint of America the business of Siberia is a very small factor. Nevertheless, the minerals, furs, lumber, and fish of the eastern portions ought not to be overlooked by Americans in their search for raw materials and food.

The Development of the Desert.—Irrigation may add a few million people to the inhabitants of the Asiatic deserts, but the products thus raised in the heart of Asia are not likely to be of much importance to a region so far away as America. On the other hand, the enormous dry area from western Manchuria and eastern Tibet to the Black, Mediterranean, and Red seas may prove to be the world's greatest unexploited storehouse of minerals. On its borders near the Hwang River in Shensi lie the great Chinese coal fields; farther west the mountains of Tibet and Turkestan contain much gold; in the Tarim basin salt deposits give promise of supplies of potash; in Persia copper has been reported again and again; in Mesopotamia and Persia lie some of the most promising oil fields; while many other places suggest great possibilities although little is yet known with accuracy. In the future metallic ores and fuels are almost certain to be relatively more valuable than now. Thus, though the deserts of Asia now seem of little value, the time may be near when they will be highly prized. The nations of Europe and also Japan are keenly interested in mineral rights and railway concessions in these regions. Even the far away United States has taken a hand by declaring the "open door" policy which insists that all nations shall have equal opportunities in China and the neighboring regions, and by insisting that Americans shall not be barred from developing oil in Persia, Mesopotamia, and other regions where Europe is encroaching. Today we are more and more advancing capital, and supplying engineers, managers, and machinery, and some day we may draw on these regions for important supplies, just as we now draw on Russia for platinum. These considerations mean that for inner Asia as for the Far East we want the open door policy, and some international control which will insure good government, protect and develop the native people, and give all countries a fair and equal chance without robbing the natives.

One of the drawbacks to the future development of the Asiatic deserts is the character of the people. Deserts, like every other type of physical environment, exert a selective action so that certain kinds of people tend to die out while other types are preserved. The nomadic life, which usually prevails in Asia where the climate is too dry for agriculture and where animals are the chief source of livelihood, gives little or no advantage to people who are steadily industrious, or who have business ability. Among the men in such tribes the thing that counts is the ability to brave danger, fight wild beasts, herd the sheep to safety in a storm, follow straying horses or camels all day and all night, or make a fierce sudden raid for plunder or vengeance. In every case swift, and relatively short activity is required. When that is over, the nomad lies down in his tent and rests. For days he may do little except spend an hour or two on horseback to see that the animals are safe and sound. The women milk the sheep, prepare the sour milk and cheese, pack up the tents for a migration, and knot the rugs or beat the felts which are the main articles of furniture and adornment. But even their work is less arduous than that of equally primitive sedentary women who hoe the crops and grind the grain by rubbing one stone upon another. In the same way business ability is of little value to the nomad. A good trader and industrious worker who did not have the courage to ford a rushing stream in the dark and the energy to get up at night to fight the wolves would make a poor nomad, and his children would probably be poorly fed. His type would gradually die out. Thus the unbusinesslike character of the desert people and their frequent lack of steady industry impose important difficulties in developing regions like Mongolia. Nevertheless, many of these people have admirable qualities, while the oasis dwellers of Turkestan and Persia have a great deal of industry although they lack initiative and energy. The great obstacle to the development of the mineral wealth of the Asiatic deserts is not so much the people as the remoteness and lack of transportation facilities.

The Contributions of Southwestern Asia to the World's Business.—Southwestern Asia interests America deeply because Mesopotamia, Syria, and Palestine were once the home of great civilizations which gave us not only religion, but the beginnings of science and art. More recently American philanthropic efforts have been especially active in this general area of the Near East. Moreover, Americans are much interested in Britain's restoration of the great irrigation system of Mesopotamia, in the French attempts to build up Syria, and in the Zionists' plans for restoring the prestige of ancient Palestine.

FIG. 65.—Looking Down on Jerusalem and the Temple Area from the Top of the Mosque of Omar.

The usual enumeration of the business relationships of Turkey, Persia, Syria, and Palestine includes the facts that those countries buy cloth, sewing machines, and other manufactured articles from the

United States, and that we buy from them large quantities of beautiful rugs, and also dates, Smyrna figs, Turkish tobacco, hides, wool and the like. This list sounds imposing, but in normal times before the Great War the total trade of all these regions with the United States amounted to only twelve or fifteen million dollars, or less than with New Zealand. Since the war the figures have been far lower. New governmental conditions are indeed opening avenues of trade that were formerly closed, but the relation of America to the Near East through education, missions, philanthropy, and the journeys of sight-seers to Constantinople and especially Palestine have more effect on American life than have our direct commercial dealings.

A still greater effect of the Near East is the fact that it has contributed to the United States as well as to the rest of the world certain racial stocks, such as the Syrians, Armenians, and especially the Jews, whose influence upon business has been extremely great in proportion to their numbers. The Jews and Armenians are generally recognized as having unusually clear cut racial characteristics. These include great business capacity; unusual perseverance and tenacity; great thrift and economy; a tendency to avoid politics, military occupations, and the walks of life that make them conspicuous as leaders and rulers; and a tendency to excel in less conspicuous but no less influential lines including not only business, but science. Of course, few Jews have all these qualities; and some depart from them widely. Nevertheless, they represent fairly well some of the main characteristics of a race which has produced an extraordinary succession of unusually able men. Perhaps no race today in proportion to its numbers has a greater influence upon business all over the world; none has had so profound an influence upon religion and thus upon moral standards; and perhaps none has proportionately contributed more to the world's scientific progress.

The origin of the racial traits of the Jews, as of every other race, is still beyond our knowledge. Certain environmental influences, however, have tended to preserve those members of the race who were most strongly inbued with the qualities mentioned above. While Palestine is generally spoken of as the home of the Hebrews, as the early Jews were called, most of that country was inhabited by them for only a short time. The ancestors of the modern Jews came from the rough little plateau of Judea, a tiny tableland about 45 miles north and south by 15 east and west. It stands like a little island surrounded on all sides by more fertile regions which the Jews could easily see from their homes. Generally their rough hills protected them from attack even though the armies of Egypt, Syria, and Assyria marched and fought on the

Philistine plain only twenty miles away, but it was not so easy to guard against the temptation to give up the hard life on the infertile plateau and go down to the rich plains. So the Hebrews who had the least strength of character or the most love of adventure and of innovation were tempted, as Samson was, to leave stony Judea and settle in the richer regions from Egypt to Babylonia. The people who remained in the Judean hills, and became the ancestors of the modern Jews were those who had extreme persistence and were willing to endure comparative poverty for the sake of the ideals which they had set up for themselves. Thus a process of natural selection may have taken place, much like that which in Scotland under somewhat similar physical conditions has probably helped to make the Highland Scotch so sturdy and determined.

Another type of selection went on through deportation and persecution. The leaders were carried captive to Babylonia. When their descendants returned to reoccupy Judea it was only the more religious and the ones like Nehemiah who stood most strongly for the old Jewish habits that came back. During later centuries the Jews, like the Armenians, have been subjected to repeated persecution which has exerted a still further selective effect. Much of the trouble arises because the persecuted race has acquired a degree of industry and persistence greater than that of their persecutors. Each persecution increases this difference, for the less strong-minded Jews or Armenians give up their own religion and become parts of the surrounding community. Even now certain so-called Turkish or Kurdish villages of fanatical Moslems show their Armenian origin by retaining Christian customs such as the sign of the cross before meals. The loss of these weaker elements has strengthened the racial character of the remaining Armenians.

Persecution weeds out certain types of people in still other ways. When massacres are carefully organized, as were those of the Armenians in Turkey, the first people to be killed are the ones who stand out boldly for their rights or are known as military or political leaders. When massacres are carried out by unorganized mobs, as in the Russian "pogroms," the mobs generally consist of the lower elements of the population. They massacre their neighbors while the able Jews who live in the better parts of the cities have more chance to escape. Thus the weaker elements of the persecuted race are killed off. A similar selection takes place in deportations. For instance, it is estimated that about a million Armenians were transported to the Syrian Desert from Armenia during the Great War. About 750,000 died and 250,000 wandered back. The American Red Cross physicians in charge of relief work say that in spite of their terrible sufferings and their months of semi-starvation the returning refugees were surprisingly strong and healthy. The weak had died,—not only the weak in body but those with less competent brains. The people who survived were those who had tough physiques, who had the wit to pick up a living on the long, hard march to the desert, who bowed submissively when necessary but knew how to wheedle their persecutors into sparing or helping them. Thus the tendency of persecution and deportation is to weed out the military and political leaders on the one hand and the weak types on the other. This tends to create a strong, tenacious, homogeneous race with the qualities which we have described as most characteristic of the Jews. No race save one that has already acquired a strong fiber either through living apart in a relatively difficult environment or in some other way, can stand such persecution. And such persecution is likely to happen where one conquering race after another is forced into a land as has happened in western Asia. Thus the contribution of southwestern Asia to modern business conditions in America has been made through the Jews far more than through any direct commerce. If we add to this the effect of the Bible in raising the standards of business few countries have had a greater influence than Palestine.

EXERCISES AND PROBLEMS

1. The effect of size on Asiatic commerce. On outline maps of Europe and Asia respectively draw lines approximately parallel to the seacoast and 600 miles from it. Compare the areas enclosed by the lines in the two continents. What countries or parts of countries are found within these lines? How much of the area more than 600 miles from the sea has less than 6 inches of rain from June to August (Fig. 6)? How does the similar interior area of North America compare with that of Asia in size? What effect do these conditions have on foreign commerce?

2. The difficulties of railroads in Asia. On an outline map of Asia draw lines showing to what extent it is now possible to go by rail from Moscow to Vladivostok, to Canton, to Bangkok, to Calcutta. Now draw lines showing how the most direct railways might reach these places. Make your railroads as straight as possible but with the necessary deviations in order to avoid the highest mountains.

For each road make a table showing: (*A*) the countries through which it would pass and also the probable cities; (*B*) the advantages of the route such as (1) a dense population, (2) abundant sources of food, raw materials or manufactured goods, (3) levelness, (4) friendly or progressive peoples; and (*C*) the disadvantages of the route, such as (1) mountains (general character, as high, broad, many ranges, etc.); (2) deserts, (3) sparsely populated forested areas, (4) probable difficulties of snow, ice, or floods.

3. Study the domination of Asia by Europeans in its agricultural aspects. On an outline map shade the Asiatic areas that are politically independent of Europeans. (Table 1 D.) What proportion of the total area do they form? What proportio

of the important cities and ports of Asia (Table 4) do they contain? What is the significance of your answers to these two questions?

From Table 11 determine how abundant the crops are in the independent parts compared with those dominated by Europeans, but remember that China, for which no statistics are available, produces more food than India. Can you see any evidence in Table 11, and especially in Table 12, that European domination has increased the production of certain products desired by Europe? Note especially India and Siberia, and compare the two. Has European domination raised the yield per acre (Table 13) to a noteworthy extent?

4. The European domination of Asia in respect to minerals. India and China probably contain a far greater abundance and variety of minerals than any country of Europe; the East Indies, Japan, and perhaps the Malay Peninsula may rival Great Britain in the variety of their minerals, although having no such supplies of coal. Supposing the above statements to be true, and taking account of the number of people in the Asiatic countries and the need of European countries for minerals from their Asiatic possessions, what do you conclude as to the degree to which European domination has led to the development of the mineral resources of Asia (Table 25)? Study the number and amount of minerals produced in the Asiatic countries compared with European countries. Compare all Asia with the United States?

5. The effect of European domination on transportation and communication in Asia. From Table 33 B, C, E, F, and H, and Table 34 B and D, prepare a table with two parts showing the condition of Asiatic countries (*A*) under European or American control, and (*B*) under Asiatic control. Compare pairs of countries like India and China; the Philippines and Formosa; French Indo-China and Siam; Dutch East Indies and both Japan and Persia. From this exercise and the two preceding draw conclusions as to how deeply Europe's presence has influenced Asia, and in what respects the influence has been greatest. Remember that European influence is evident even without political control. How is this apparent in Exercises 1, 2, and 3?

6. Compare the foreign trade of Asia with that of other continents. From Table 39 determine the total exports and imports of Asia in 1913. In each of the other continents find areas with as small a population as possible which have a foreign trade equal to that of all Asia. Do the same for the trade of Asia with the United States. What impression does this give of Asia's trade? List under each continent, and in the order of their trade per capita, the countries which have smaller per capita imports than Formosa. On a map of the world shade all the regions contained in your list. What strongly marked distribution of countries do you find, and what does it mean? Do the same for exports. What differences, if any, can you detect between your maps of imports and exports? Why?

7. Compare the rest of Asia with the southeastern part from Chosen and Manchuria to India, including the islands. Divide this problem among the class, letting different members determine the percentage of (*A*) population and area in each of the two sections (Table 1); (*B*) main crops (Table 11); (*C*) animals (Table 14); (*D*) minerals (Table 25); (*E*) means of transportation and communication (Tables 33 and 34); (*F*) foreign commerce (Tables 38, 39, and 40). Bring together all the available data and draw conclusions as to the nature of the products and degree of importance of the vast western, central, and northern parts of Asia, compared with the southeast. Show the geographical reasons for the conditions of these parts.

8. Adopt Exercises 5, 6, 7, and 8 in Chapter XVIII to Asia and work them out.

CHAPTER XX

INDIA AND THE FAR EAST

The Great Possibilities of Southeastern Asia.—The region from India to Japan may be called Southeastern Asia. Its relatively low latitude and heavy summer rains enable enormous crops to be raised. An area of approximately two and a half million square miles in the more populous parts of India and China contains about 600 million people—35 per cent of the earth's population in less than 5 per cent of the total land surface. In the neighboring islands of Japan and the East Indies, and in the peninsulas of Chosen and Indo-China an additional million and a half square miles support 150 million more people. Thus in southeastern Asia and the neighboring islands an area scarcely larger than Europe contains 60 per cent more people than that continent, or almost half the world's population.

The agricultural possibilities of this area surpass those of Europe, for in many places two or three crops can be raised each year. The coal and iron of China are scarcely less abundant or easily worked than those of the United States or Europe. The great rivers, the deeply indented seacoast, the innumerable islands, and the comparative freedom from storms during much of the year provide natural facilities for transportation even better than those of Europe. The rivers from the Ganges to the Hwang Ho might furnish more waterpower than is available in almost any similar area. If the 750 million inhabitants could develop their coal, harness their rivers, build and run their own factories, extract the mineral wealth of the dry regions back of them, and guard themselves against the ever-recurring famines, the world might perhaps see an industrial development even greater than that of the United States or Europe.

Except in Japan the people of southeastern Asia have thus far shown little promise of carrying out such a development. Today the average foreign commerce of China per person is less than one-twentieth of that of the United States. Internal trade is equally sluggish. In industry this vast hive of humanity plays only a minor rôle, for outside of Japan most of the manufacturing is of the primitive type,—home industries, with here and there a plant for simple manufacturing run by Europeans or Americans in order to prepare foodstuffs or half-manufactured raw materials for use in other countries. Politically about half the people of this highly favored area are subject to Europe. Three-fourths of the remainder live in China, a country which is feebly struggling to keep its independence and to avoid being completely dominated by Europeans or Japanese. Siam, though nominally independent, is largely dominated by England and France. Among these 750 million human beings only the 60 million who live in Japan have genuine independence and a large share in the world's business because of their own initiative.

The Far Eastern Question.—With the growing unity of the world and the growing tendency for all active peoples to reach out and use the resources of other regions, it is inevitable that the wonderful possibilities of India and the Far East should be utilized. If the resources should be even moderately developed, and if the vast population should become even moderately able to purchase goods, the increase in the world's business would add enormously to the wealth of other nations. The realization of this makes the problem of the Far East extremely critical. The problem centers primarily around the question of who shall exercise political and commercial control in China? Shall it be Japan, the only energetic nation in that part of the world? Shall it be the United States, the strongest power that borders on the Pacific? Shall it be Great Britain, France, and the other European powers which already control about half of southeastern Asia? Shall India, China, the Philippines, Java, and the other parts of the Far East control their own destinies? Shall the League of Nations or some other association of the nations exercise control? Or shall China and other nations be self-governing parts of a great world state somewhat as Arizona, Oregon, and Maine are self-governing parts of the United States? In one or another of these ways the Far Eastern Question must apparently be answered. And the answer will be one of the most important factors in determining the course of the world's business. It will influence not only the Far East, but every part of the world.

India's Share in World Trade.—The part played by India in the world's business may be judged from the following table of exports and imports. The first noteworthy fact is that India does not supply the world with much food. If we omit tea, coffee, spices, opium and tobacco, India in 1919–1920 supplied foreign countries with only about 50 million dollars' worth of real food. Canada, with only nine million people against India's 315 million, supplied over 500 million dollars' worth of food. In other words the value of the average Canadian in supplying the rest of the world with food is about three hundred times as great as that of the average Indian.

FOREIGN TRADE OF INDIA, 1919–1920

Millions of dollars. (Rupee reckoned as fifty cents.)

EXPORTS.	
I. *Foods, drugs, narcotics, etc.*	
A. Farm products.	
1. Rice	35
2. Wheat-flour, etc	10
3. Opium	7
4. Tobacco	3
B. Orchard, and plantation products.	
5. Tea	68
6. Coffee	6
7. Spices	5
8. Fruits, etc	4
9. Sugar	2
II. *Raw materials.*	
A. Vegetable products.	
10. Raw cotton	195
11. Oil seeds, oil	104
12. Raw jute	82
13. Rubber	6
14. Raw hemp	6
15. Wood	5
16. Indigo	4
17. Dyes and tans	4
18. Coir	3
B. Animal products.	
19. Hides and skins	120
20. Lac	24
21. Raw wool	14
22. Manures	5
23. Raw silk	1
C. Mineral products.	
24. Paraffin wax	4
25. Coal	3
26. Saltpetre	2
27. Manganese ore	2
III. *Manufactures.*	
A. For further manufacture.	
28. Jute goods	167
29. Cotton goods	91
30. Woolen goods	2
B. Ready for consumer. Not separated from III A.	

IMPORTS.	
I. *Foods, drugs, narcotics, etc.*	
A. Farm products.	
1. Liquors	11
2. Grain	10
3. Provisions	10
4. Tobacco	7
B. Orchard and plantation products.	
5. Sugar	77
6. Spices	8
7. Fruits, etc	6
II. *Raw materials.*	
A. Vegetable products.	
8. Dyes and tans	6
9. Wood and lumber	5
B. Animal products.	
10. Living animals	1
C. Mineral products.	
11. Metals and ores	73
12. Salt	7
III. *Manufactures.*	
A. For further manufacture. Negligible.	
B. Ready for consumer.	
a. Clothing and textiles.	
13. Cotton goods	197
14. Silk goods	26
15. Woolen goods	5
16. Clothing, shoes, etc	10
b. Machinery, tools, etc.	
17. Machinery, etc	32
18. Railway equipment	15
19. Hardware	15
20. Motor cars	13
21. Instruments	7
c. Other goods.	
22. Books, paper, etc	12
23. Matches	7
24. Glass, earthenware	9
25. Drugs, chemicals, etc	11
26. Paints	4
27. Soap	4
28. Building materials	4
29. Tea chests	2

Another noteworthy fact is India's large export of raw cotton, oil seeds (chiefly for linseed oil), and jute. But compared with the population these quantities are small. Texas, with 4½ million people, produces just about the same amount of cotton as all India. Hides and skins are a fairly abundant Indian product because India has a huge number of cattle. Nevertheless, India exports only a trifle more than Italy, not much over half as many as Argentina with its 9 million people, and less than the one small country of Belgium imports each year. The lac of India, although of relatively small value, is interesting as a gum secreted by insects and used in varnishes.

The manufactures exported from India are practically limited to the twisted fiber and thread of jute and cotton, or to coarse fabrics made from those products. By far the larger part is destined to be further manufactured in Europe before it reaches the final consumer. Thus three-fourths of India's exports consist of cotton, jute, oil seeds, and tea, either unmanufactured or only slightly and coarsely manufactured.

As to imports, if India does not supply the rest of the world with food, she at least demands little from outsiders except sugar. Her demands for raw materials are still more modest, except in the case of metals, which means chiefly iron. The imports that India wants are clothing, chiefly cotton, but some silk; and a relatively small amount of machinery, railway equipment, and automobiles, together with from one to three cents' worth per person of paper, books, glassware, drugs, soap, and the like.

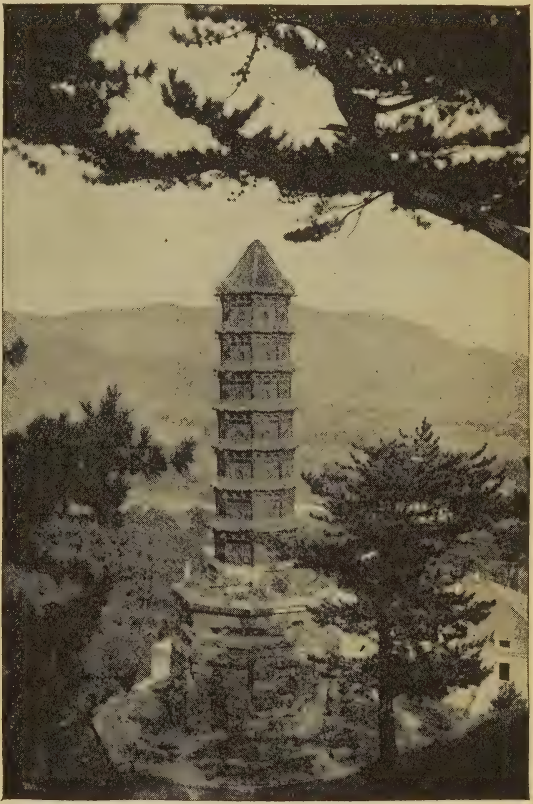
The Reasons for India's Scanty Trade.—The reasons why India plays so inactive a part in business may be partly racial, but they are probably much more economic and social. The tropical rice farmer described in Chapter XII represents millions of Indians, who have little energy, ambition, or education, who live so closely packed that they can scarcely get a good living from the soil no matter how industrious they are, and who have practically no industry except agriculture. The people of India, however, display great differences because derived from many immigrant stocks. The quick energy of the Sikhs in battle is famous, as is the anemic lassitude of the slender Bengali. Great business capacity and high mechanical ability are rare, although small groups are very competent, and many Bengalis, for example, are good traders. The Parsis of Bombay, a remnant of the Fire Worshippers who were driven from the towns of Persia, are uncommonly good business men. They are active in the cotton and jute industries, two of the few lines where a moderate amount of manufacturing has been started. Some of the upper caste Brahmins are intellectually of high caliber. Men like the poet Tagore command respect everywhere. Yet even in such men imagination, poetic instinct, and the power to philosophize are usually more highly developed than are the qualities of steady, laborious work and the painstaking scrutiny of facts which are necessary in modern science, or the power of quick decision and energetic action which are especially needed in modern business.

One of the greatest hindrances to the economic development of India is repeated famines. India depends almost wholly on the monsoon rains which begin anywhere from April in the south to June in the north, and last till September or October. If the rains are delayed or do not last long enough, as happens frequently, the crops may fail. Such calamities not only kill millions of people through hunger and the fevers that usually follow, but also check the accumulation of capital. In the extremity of famine the poor peasants and many of the townsmen sell anything. Worse still, they acquire a hopeless spirit of resignation which is fatal to progress. Their great idea is not so much to improve their farms and increase their working capital, as to lay aside coins and jewelry which can be sold in time of famine, but which have little value in stimulating industry, commerce, and other forms of business. Under the tutelage of Great Britain, India's business is indeed increasing, but the character of the people does not yet seem to be appreciably changing. It is doubtful whether it will ever change until disease, malnutrition, and anemia are eliminated and education has a chance to develop among a people free from physical handicaps.

Britain's Relation to India.—The industrial and commercial expansion of India is generally believed to depend on intelligent direction by Europeans. If left to itself many people think that India would go back to chaos. Great Britain wants to retain India. A large number of British fear that the loss of India would destroy the British Empire even though the trade with that country amounts to only about 12 per cent of Britain's total. On the other hand the Indian nationalists claim that India could govern herself peaceably and make more progress without British help than with it. Those who actively support this claim are a small group of the brighter minds who have acquired European education, who are able to write cleverly, and who are themselves eager to control the masses. In spite of their small numbers they create considerable discontent with British rule. Boycotts of British goods have been tried and may be tried again.

Probably the export of cotton manufactures and steel goods to India and the import of tea, oil seeds, jute, and cotton are not so essential to the British Empire as the English think. Probably India is not nearly so able to rule itself as the Indian leaders would have us believe. Certainly the vast irrigation system and the many railways which the

British have built, and the famine relief which the government has established have done much to save life and prevent distress in times when the rains are scanty and the crops fail. Left to themselves the people of India would probably never have done these things, and it is doubtful whether they could maintain them long or greatly improve their industrial system without outside aid. Altogether the problem of how Europeans can aid in the development of India with profit both to that country and themselves is one of the most puzzling that now faces the British Empire. The fundamental need is wise cooperation between Europe and Asia, and mutual respect of each for the good qualities of the other. America's part in all this is small compared with Britain's, for less than a sixth of India's business is with this country, while nearly two-fifths is with Britain. Nevertheless, in 1921, we received from India as much as from Argentine, Uruguay, Paraguay, and Bolivia combined, and sent thither as much as to the whole west coast of South America.



Courtesy of Asia Magazine.

FIG. 66.—Porcelain Pagoda in the Western Hills near Peking.

The Trade and Possibilities of China.—China is even more populous than India. Its natural resources are probably greater because of its well-watered plains, fine coal, and highly mineralized mountains and deserts in the interior. Its natural transportation facilities are better than those of India because of its good harbors and great navigable rivers. Most important of all, its people are generally considered more industrious, more thrifty, more energetic, and more intelligent than the Hindus. Yet China's foreign trade before the Great War was scarcely half that of India. Only in later years while India and Europe were recovering from the effects of the war has China taken the lead.

FOREIGN TRADE OF CHINA AND INDIA

	China.	India.
1914	$ 612,000,000	$1,387,000,000
1915	548,000,000	1,053,000,000
1919	1,736,000,000	1,324,000,000

The variety of exports from China is even less than from India, as appears from the following table.

FOREIGN TRADE OF CHINA, 1919

Millions of dollars.*

Exports.	
I. *Foods, drugs, narcotics, etc.*	
1. Tea	22
II. *Raw materials.*	
A. Vegetable products.	
2. Beans, beancake, bean oil	94
3. Raw cotton	30
B. Animal products.	
4. Silk, raw and manufactured	138
5. Hides	10
C. Mineral products.	
6. Tin	8
III. *Manufactures.*	
Negligible.	

Imports.	
I. *Foods, drugs, narcotics, etc.*	
1. Rice	8
II. *Raw materials.*	
A. Vegetable products.	
....	
B. Animal products.	
2. Fish	11
C. Mineral products.	
3. Coal	13
III. *Manufactures.*	
4. Cotton goods	210
5. Metal goods	57
6. Cigarettes	21
7. Woolen goods	4

* Haikwan tael reckoned as one dollar.

Silk, bean products, cotton, and tea comprise the great bulk of China's contribution to world trade. A little of the exported silk is manufactured, but the total amount of manufactures is almost negligible. The chief role of China, as of India, is to furnish raw materials. The foreign purchases of the two countries are also alike. Neither buys much food, but both demand a large amount of cheap textiles and clothing, a smaller amount of machinery and metal goods, and a little of other kinds of manufactures.

In spite of the fact that the trade of China as well as India is small per capita, the vast number of people and the possibilities of future expansion make it one of the most valuable prizes for the active commercial and industrial nations. In India the development of the country for a hundred years by the British has to a considerable degree opened up the possibilities, but in China development has only begun. Suppose China should increase her 6000 miles of railways to equal the 37,000 of India, and should improve the natural waterways, control the floods, provide insurance against famine, harness the waterpower, construct mills, direct the vast supplies of steady, reliable Chinese labor, open up the great coal and iron deposits, and explore and develop the copper and other mineral resources of the great plateaus and deserts of the interior. Suppose also that China were to supply her own greatest need in the way of raw materials by bringing wood from the vast forests which border the Siberian coasts and rivers, or from the richly forested tropical islands of the south. Suppose that China were to remedy the chief lacks in her food supply by bringing dairy products and wheat from southern Siberia, beef and mutton from that same region and Central Asia, and fish from the richly stocked ocean off the Siberian coast. Suppose modern science were to eradicate the hookworm, malaria, malnutrition, and other ailments which hamper the Chinese and help to make them slow. And finally suppose modern education were to become universal and thus increase the naturally keen capacities of the Chinese.

If all this were to happen, and there is no reason why it should not, it would be enormously profitable not only to the Chinese themselves, but to foreigners. Other nations recognize this possibility. They also realize the abundant supplies of staple raw materials that can be procured in China and the vast market which she would furnish if once drawn into the paths of modern industrial and commercial development. Hence arises the main problem in the Far Eastern Question, namely, who shall control China and how?

PERCENTAGE OF CHINESE TRADE WITH FOREIGN COUNTRIES

	Percentage of Imports Derived from Regions Named.		Percentage of Exports Sent to Regions Named.	
	1913.	1919.	1913.	1919.
Hongkong	30	24	29	21
Japan	21	38	16	31
Great Britain	17	10	4	9
United States	6	17	9	16
Germany	5	..	4	..
Russia (Siberia)	4	0.3	11	1
Belgium	3	..	2	..
France	1	..	10	..

So far as mere volume of trade is concerned a partial answer to this question is found in the accompanying table. The first two columns show that between 1913 and 1919 there was a relative decline in the Chinese imports from all the European countries and from Hongkong, which chiefly delivers British and other European goods to China. There was a corresponding increase in the imports from the United States and Japan. The same was true of exports. Of course the war had much to do with this, but part of the change due to the war will probably be permanent. This is shown in the next table which gives the percentage of the total trade of the United States with various countries of the Far East. There it appears that the percentage of American imports from the Far East doubled during the war, while the percentage of American exports that goes to China, Japan, and India, is steadily increasing.

PERCENTAGE OF TOTAL TRADE OF THE UNITED STATES WITH THE FAR EAST

	Imports.			Exports.		
	1913–14.	1920.	1921.	1913–14.	1920.	1921.
Japan, including Chosen	5.7	7.9	10.0	2.2	4.6	5.9
China, including Hongkong	2.2	4.7	4.5	1.6	2.2	3.0
British India	3.9	3.3	3.1	0.5	1.2	1.3
Philippines	1.0	2.1	2.1	1.2	1.2	1.0
Other East Indies and Indo-China	2.3	4.4	4.1	0.4	1.0	1.0

All these figures indicate that Japan, the United States, and Great Britain have the greatest interest in Chinese trade. Those three countries played the chief part in a Conference which met in Washington in 1921, and framed new treaties dealing with the regions bordering the Pacific Ocean. The United States and Great Britain insisted upon what is known as the open-door policy, and Japan agreed to it. According to that policy all foreign countries have equal rights and privileges in China. At the same time China must be helped to preserve and maintain her own government and to quiet the internal quarrels which have distracted the country since it became a republic in 1912.

The Relation of Japan to China and to World Trade.—In the problem of the Far East Japan is the main active factor just as China is the main passive factor. The foreign trade of Japan, as given below, shows this very clearly.

FOREIGN TRADE OF JAPAN, 1920

Millions of dollars. (Yen reckoned as fifty cents.)

Exports.	
I. *Foods, drugs, narcotics, etc.*	
A. Farm products.	
1. Rice	3
B. Orchard and plantation products	
2. Tea	9
II. *Raw materials.*	
A. Vegetable products.	
3. Camphor	2
B. Animal products.	
4. Raw silk	192
C. Mineral products.	
5. Coal	23
6. Iron	7
7. Copper	6
III. *Manufactures.*	
a. Clothing and textiles.	
8. Cotton yarn and tissues	244
9. Silk floss and tissues	93
b. Machinery, tools, etc.	
10. Machinery	9
c. Food products.	
11. Refined sugar	15
d. Other goods.	
12. Glass and earthenware	28
13. Matches	14
14. Toys	11

Imports.	
I. *Foods, drugs, narcotics, etc.*	
A. Farm products.	
1. Beans and peas	24
2. Rice	9
3. Oil cake	75
B. Orchard and plantation products.	
4. Sugar	30
II. *Raw materials.*	
A. Vegetable products.	
5. Raw cotton	362
6. Flax and hemp	8
7. Crude India rubber	7
8. Wood pulp	7
B. Animal products.	
9. Wool	61
10. Hides and skins	10
C. Mineral products.	
11. Iron	101
12. Saltpetre	12
13. Petroleum	111
14. Coal	10
III. *Manufactures.*	
a. Clothing and textiles.	
15. Woolen tissues	16
b. Machinery, tools, etc.	
16. Machinery	55
c. Food products.	
Negligible.	
d. Other goods.	
17. Aniline dyes	8

Notice how little Japan exports in the way of food. The only really important raw material exported is silk. But manufactured goods rise to large proportions, especially yarn and textiles. Among the imports, on the contrary, food and manufactures play a fairly large part, but the most important items are raw or semi-manufactured materials, especially cotton, wool, iron and petroleum. Japan wants these things for her factories. Her trade has the same qualities as that of Great Britain except that she does not yet import anywhere nearly so large a proportion of food. But she is tending in that direction. She wants food, and the raw materials needed to maintain and enlarge her factories.

She wants great markets where she can sell the products of those factories. Chosen and Manchuria are not enough. China has just what she wants, and China is close at hand. It is not surprising that Chinese trade amounts to about 16 per cent of Japan's total, while the corresponding figure for the United States is only 3, and for Great Britain 2. In other words China's trade is the largest single factor in the foreign relations of Japan. The Japanese feel that they are the natural people to develop China and provide the education, the science, and the leadership that China now lacks. The main problem of the Far Eastern question is how can Japan develop a program of reasonable industrial, commercial, and financial expansion, while China also has a free opportunity and the rest of the world has a fair chance. The only answer lies in close friendship and cooperation with one another and with China on the part of the three great maritime nations, the United States, Great Britain, and Japan.

Courtesy of Asia Magazine.

FIG. 67.—Harvesting Rice in Japan.

The Contrasted Character of the Chinese and Japanese.—The reason why Japan and China play such strongly contrasted parts in the Far Eastern Question, and thus in the business relations of the world, is found partly in certain deep-seated differences of character. The Japanese, though small of stature, are an unusually alert, wideawake people. While not so inventive as the Nordics, they are very quick to recognize and adopt a good thing when they see it. One of the most notable facts in world history has been the speed and thoroughness with which the Japanese, as soon as western ideas were brought to them, recognized their value and began to profit by them. This does not mean, as many people suppose, that the Japanese were barbarians before Commodore Perry induced them to make a treaty with the United States in 1854. Contrary to what is often stated, they were then, as now, by far the most progressive people of Asia. For centuries they had been making gradual progress and when they saw that western science and industry were good, they quickly adopted them. Not all the Japanese, however, have this progressive spirit. There is a great contrast between the relatively conservative masses of the people, and the quick-minded, capable leaders belonging to the old nobility and the Samurai or warrior class. In other words, Japan has a large body of industrious, conservative peasants who make good sailors, factory operatives, and manual workers, and she has a relatively large number of progressive, competent leaders.

In China the case is different. Many people think that in real ability the Chinese are the equals of any other race. But almost everyone agrees that China as a whole is extremely conservative. The common people, especially in the north, are so wedded to old customs that it is almost impossible to change them. Moreover, China's relatively democratic form of social organization helps to cause this conservatism to be shared by the leaders. In Japan the Samurai married only among themselves and thus retained the qualities of leadership which originally raised them to their high position. In China a system of universal education and public examinations made it possible for the son of the poorest peasant to rise to positions of importance. This has had some excellent results, but it has tended to make the leaders conservative like the peasants.

With this conservatism goes a deplorable lack of public spirit. The Chinese tend to look after their own interests. This is one reason for the inefficiency and corruption of the Chinese government. The officials rob the public treasury more systematically and openly than in most countries not because they are especially bad, but because the mass of the Chinese are so callous to all matters that do not immediately touch them, that almost no one raises a protest. Hence business is greatly hampered because its success depends very closely upon the quality of the government. The best governments are the most criticised. England, for example, hears constantly from her people that she is being ruined by this or that defect of government, while China hears little about her own defects. Hence abuses are remedied in England but continue and grow worse in China.

The Japanese, on the contrary, have a much stronger tendency to look after the public welfare. An illustration of this is the hara-kiri, or custom whereby it was considered right and noble for a Samurai to kill himself if he failed in some public duty.

Certain other prominent Chinese traits are intense economy, great thrift, wonderful patience and endurance, and the capacity to live on the smallest possible allowance of food. These qualities are very valuable except that they are usually accompanied by undue conservatism.

It is partly this quality of conservatism joined with really remarkable skill in certain respects, which makes the Chinese so wonderful in their ability to make exact copies of anything that they have once carefully examined. If an American tailor is given a coat and told to make one like it, he often suggests making the new coat different from the old one. A Chinese tailor, on the other hand, was once given a coat in which a large torn place had been mended in the back, and told to make a new coat of the same kind. He made it, and tore a rent in the back and sewed it up. He did not think of making any change in the coat.

Some Reasons for the Difference between Chinese and Japanese.— We have already seen that one reason why the Chinese are less ready than the Japanese to adopt new methods is the social system whereby the students who could best pass examinations in the Chinese classics have been the ones who have risen to the top and become leaders. Slow, patient labor and a vast amount of memorizing were the qualities which gave success in the examinations. Among the Japanese, on the other hand, the ones who rose to be leaders were usually those who showed initiative in war or in pushing themselves to the top by active effort. Famines are another agency which has helped to make the Chinese more conservative than the Japanese. These are especially severe in North China because spring droughts and summer floods often occur together. Practically all of North China has less than an inch of rainfall per month from October to April, and only in May does the rain begin to be abundant enough for agriculture. If the beginning of the rains is delayed, as happens not infrequently, the farmers who depend only on rain may be able to raise almost nothing. The many who depend on irrigation, however, do not suffer so much. But then comes the second trouble: when the rains finally burst, they usually fall in showers of great violence. Since the spring droughts prevent the growth of trees on the mountains the rain pours down the hillsides, and floods the fertile, irrigated lowlands, especially the great flat plain of the Hwang-Ho, so that the crops are often ruined.

Such famines often throw scores of millions of people into danger from starvation. Here, as in so many other cases, Nature applies her principle of natural selection. The only way to survive in a Chinese famine is either to stay at home and eat very sparingly until new crops can be raised, or to wander away to distant regions where the famine is less severe. In either case the people who combine intelligence and physical vigor are the ones most likely to survive. But suppose two men are alike in these respects, but one has a nervous, active temperament and wants to be doing something while the other is slow, steady, and careful. Americans who have had experience in Chinese famines say that a man of the first type is likely to migrate to the city or to some distant region where there is no famine. If he and his family go to the city, their descendants gradually die out. Even in the United States, with all our public health measures, the urban death-rate in states where the cities have no special advantage such as a location near large bodies of water is about 25 per cent greater than the rural death-rate. In China the urban death-rate is so high that the city population would die out if people from the country did not constantly migrate cityward. So the energetic and active Chinese whose descendants should become inventors and leaders are largely lost either through the high death-rates of the cities or through migration to other regions.

On the other hand, the family which is exceedingly careful, cautious, and economical survives. Such a family stays at home, sleeps till the middle of the morning so long as there is no work, eats a single scanty meal at noon, and lies down again in the middle of the afternoon. Famine workers describe exactly this process again and again:—the more active people moving to the cities or to other regions, the slow, conservative, economical, thrifty, and hardy ones remaining behind to build up the next generation, and the weaker people dying. Thus the famines have helped to produce some of the best racial qualities of the Chinese as well as some of the defects which play so important a part in determining the business relations of the Far East.

In South China, where famines are rare, the Chinese are much more progressive and active than in the north, which is one reason why most of the Chinese in America are Cantonese. This also helps to explain why foreign trade is more active in the south than in the north, although relative nearness to India and Europe is also important. In the revolutionary troubles after the establishment of the Chinese Republic, North China was consistently conservative and reactionary, and wanted to restore the old imperial regime, while South China was progressive.

In Japan the geographical environment has acted in quite a different way. The protection of the ocean has allowed Japan to develop without being overrun by nomads as has happened to China. The presence of the ocean and the many fine bays, combined with the rough character of the land, has also made the Japanese take to seafaring far more than has been the case with the Chinese. People who go to sea upon stormy waters such as those around Japan gradually become relatively bold and adventurous. They seem to have a gift of leadership and the ability and willingness to follow their leaders, partly perhaps because those who have not these qualities are more likely than the others to perish in storms. A process of natural selection seems to give an advantage to the seafaring people.

Again while Japan sometimes suffers from poor crops, its rains are derived from cyclonic storms at all seasons as well as from the monsoon rains in summer. Hence there are never famines of such severity as in China, and there is no such severe process of natural selection whereby the energetic ones are driven out, and the thrifty, conservative people remain. Moreover, as we saw in Chapter VI, Japan is the one country of Asia which enjoys a climate which approaches that of western Europe and the United States in its healthful and stimulating qualities. Thus Japan has a great many advantages which give her energy, leadership, and the power to expand and to dominate other people, while China's fine qualities, although perhaps equally valuable, tend toward the quieter virtues and make it hard for her to introduce new methods, and stand up against energetic foreigners.

EXERCISES AND PROBLEMS

1. Make a map of Asia showing the distribution of population. This can be done in several ways: (*a*) by inserting in each country a bar proportional to the number of inhabitants; (*b*) by inserting a dot on the map for each 500,000 or 1,000,000 people; (*c*) by making a solid square in the country, the area of each square being proportional to the number of inhabitants in that country; (*d*) by using different symbols for different numbers of people as in Figs. 83 and 86. Let various members of the class try different methods. Which is the most effective?

2. Find out what the foreign commerce of Japan and Great Britain indicates as to the relative economic condition of the two countries. On a map of the world draw arrows from Japan and from Britain to represent the three classes into which British commerce is usually divided: I. Food, drink, and tobacco. II. Raw materials. III. Manufactured articles. Let the lengths of the arrows be proportional to the values of the respective classes of commodities in each of the two countries. Base your work on the Statesman's Year Book and the tables in this chapter. Omit foreign and colonial produce, count coal and pig iron as raw materials. Make separate maps for exports and imports. Point out the resemblances and differences (*A*) of the two maps, (*B*) between Japan and Great Britain in each map. What do the maps indicate as to the relative economic development of the two countries?

3. From Table 9 compare the use of the land in British India and in Japan. In what respects does each excel? How far can you account for the differences by physical characteristics? Compare these countries with others in Table 9 and prepare what you would consider an ideal method of using the land. Which Asiatic country comes nearest the ideal?

4. From Table 11 and the tables of exports and imports in this chapter figure out the per capita consumption of staple foods in Japan and India. This is possible by adding the production of any staple to the amount imported, subtracting the exportation, and dividing by the number of inhabitants. How do the figures which you obtain compare with those for Great Britain and the United States? Can you explain the differences by any physical characteristics of the respective areas?

5. According to Table 14 there is a marked difference in the number of animals in India and Japan. Account for this great variation. Study the optima for the rearing of cattle and see how far an explanation along this line is feasible.

6. Use Table 25 as a basis for comparing the mineral production of India, China, and Japan with that of your own country and state. Construct graphs exhibiting the comparisons.

7. On a map of the world plot the number of cotton spindles per thousand people (Table 30), and insert four degrees of shading according to the intensity of the cotton spinning industry. How far does the map give a true idea of the per capita consumption of cotton by each of the leading countries? In the section on " Statistics of Cotton " in the Yearbook of the U. S. Department of Agriculture use two of the tables as the basis for computing the per capita consumption of *raw* cotton in the leading countries. Why is the word raw in italics?

From Table 30 construct a map of the U. S. similar to your world map of cotton spindles. In what parts of the United States is the cotton industry comparable with that of India and Japan?

Plot on a map of the world the movement of cotton (raw) to the spindles. Would you call cotton a commodity of much importance from the standpoint of commerce? How does it compare with wheat? Rice? Corn?

8. Use the European exercises of Chapters XVII and XVIII as the basis of problems on Asia to be given to the rest of the class for solution.

9. Obtain all possible statistics for China in this book, in the Statesman's Year Book, and in the encyclopedia. Use them as the basis for an account of the business geography of China. Introduce your account by an explanation of the nature of the difficulties that you meet.

CHAPTER XXI

AFRICA: THE CONTINENT OF EUROPEAN EXPLOITATION

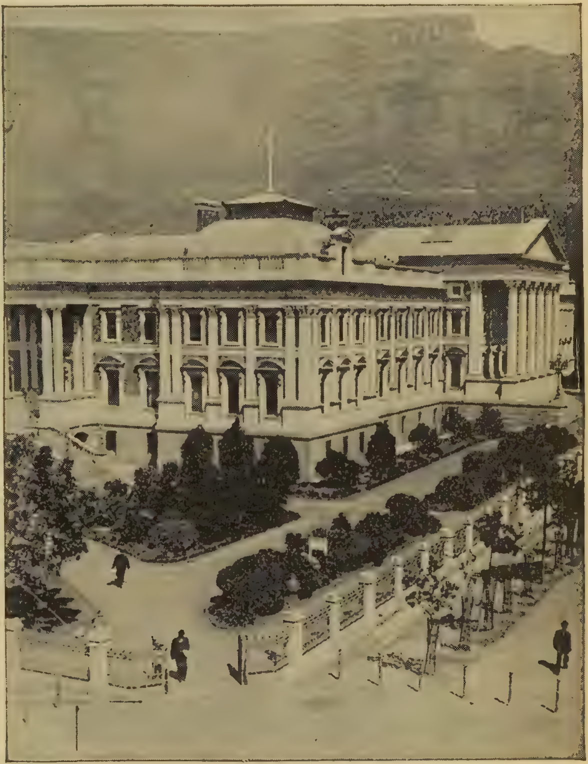
The Meagerness of Africa's Business.—From the standpoint of business, as in other respects, Africa is the most backward of the continents. A partial measure of this backwardness is found in the foreign commerce. The year before the Great War, as nearly as data are available, the total exports of Africa with its twelve million square miles and 130,000,000 people, amounted to $845,000,000, or $6.50 per person; those of Australia and New Zealand (3,000,000 square miles and only 6,000,000 people) amounted to $477,000,000, or about $80 per person.

The inactivity of most of Africa becomes still more evident when we compare the small portions which contain a fairly large number of Europeans with the vast remainder which appears at the end of the following table:

	Area.	Population.	Exports, 1913.	Exports per Capita.
Tunis	50,000 sq. mi.	1,780,000	$34,480,000	$19.40
Algeria	184,000 sq. mi.	5,564,000	98,530,000	17.65
Egypt	12,200 sq. mi.	12,000,000	156,510,000	13.00
Union of South Africa	473,000 sq. mi.	6,000,000	316,880,000	52.80
Remainder	11,000,000 sq. mi.	105,000,000	239,000,000	2.28

The scarcity of exports in the main part of Africa is the more remarkable when we consider that except for the remote plateau of Abyssinia and the little country of Liberia, the whole region is under the rule of Europeans who are eager to develop tropical trade. The causes of Africa's economic backwardness are found partly in the lack of deep indentations and harbors on the smooth coast; partly in the rim of mountains which almost everywhere border the continent and cause rapids and falls in the rivers; and partly in the poverty of the soil, which in large areas within the tropics is of the poor lateritic type. Still more important is the climate, for both in the Kalahari and far more in the Sahara vast regions are desert, while large areas within the tropics are extremely enervating to the natives as well as to Europeans. For this reason, and because of ignorance, superstition, and other weaknesses, the people of Africa are on an average more inefficient than those of any other continent.

The More Active Parts of Africa.—The really active part of Africa comprises three small areas in the extreme north and south. There the climate permits the white man to live in comparative health and comfort. (*a*) The French colonies of Algeria and Tunis are so near France that fruit and spring vegetables can be shipped to France almost as easily as from Florida or Cuba to New York. (*b*) Egypt not only possesses a limited area of land rendered extremely fertile by irrigation from the Nile, but lies near the Suez Canal, perhaps the most important of all artificial waterways. This great highway from Europe to India is of such vital importance to the British Empire that England feels that she must hold it. Moreover, the long-stapled Egyptian cotton is of such an unusually good type and the yield per acre is so great that it has been worth while for Britain to invest large sums in great irrigation works at Assuan and elsewhere. Nevertheless in 1922 Britain deliberately gave Egypt its independence, retaining only the right to guard the canal, protect foreigners, and interfere in case of



Keystone View Company.

FIG. 68.—Parliament Buildings and Cliffs of Table Mountain, at Cape Town, South Africa.

The white man has made himself and his architecture more at home in the extreme south than in almost any other part of Africa.

certain domestic disturbances. The relation of Egypt to Britain is much like that of Cuba to the United States.

(*c*) South Africa is remote compared with Algeria and Egypt, but its subtropical position, the altitude of its plateau, and the presence of great gold and diamond fields help to make it a place where the British have put forth much effort. There the presence of a million and a half white people, chiefly of English and Dutch descent, has led to self government in the form of a Dominion of the British Empire.

The nature of the business and the mode of life of these three active parts of Africa as compared with the remaining 11,000,000 square miles is illustrated by the table of exports on the next page.

Those portions of Algeria, Tunis, and Morocco, north of the Atlas Mountains are inhabited by small farmers living in compact villages. The topography is relatively rugged, and the rains, though limited to the winter, are far more abundant than in the neighboring desert. The advantages of these conditions and of nearness to Europe are evident in the fairly well balanced quality of the French North African list of exports which represents all the great classes of products aside from manufactures. Such a list is typical of a long settled region of small farmers living in compact villages in a fairly mountainous region with winter rains and summer droughts, and with desert areas close at hand. The high proportion of barley compared with wheat indicates that here we are close to the border of the climatic zone where wheat can grow, for barley is a product of poor climates as well as of poor soils. The noteworthy development of the products of trees, bushes, and vines is characteristic of the Mediterranean climate. In view of the fame of North African dates it is surprising to find that they occupy so unimportant a place. Even though part of the dates are classified under fruit, the total is still small. Under " leaves and fibers " the production of tobacco is about what might be expected, but the fame of esparto grass as a material for ropes, baskets, mats, sandals, and paper would lead one to expect a much larger production. Esparto grass and dates illustrate the fact that popular books and magazine articles often emphasize minor but picturesque products, and say little about the great staples which are of chief importance in commerce.

The animal products in the list for French North Africa indicate that sheep are the most important animals, as is natural in a dry, mountainous region. Among the forest products timber seems to be unexpectedly important until one remembers that the high mountains are covered with forests among which cedars like those of Lebanon are especially interesting. Cork is produced here for the same climatic reasons which make it a great product of Spain and Portugal. The production of

APPROXIMATE CHIEF EXPORTS FROM AFRICA IN 1913

(In millions of dollars)

French North Africa.	Egypt.	Union of South Africa.	Remainder.
1. Cereals and Vegetables.			
Wheat........ 7	Total....... 22	Negligible	Grain and oil seeds......... 2
Barley........ 6			Ground nuts... 2
Oats......... 4			
2. Food Products from Trees, Bushes and Vines.			
Wine......... 28	Negligible	Negligible	Palm kernels and oil...... 36
Olive oil...... 4			Cocoa......... 14
Fruit......... 4			Kola nuts..... 3
Almonds...... 1½			Cloves........ 2
(Dates...$250,000)			
3. Leaves and Fibers.			
Tobacco...... 2½	Cotton..... 128	Negligible	Cotton........ 4
Esparto grass.. ¾	Tobacco.... 2		Tobacco....... 1
4. Animal Products.			
Sheep........ 7	Total...... 3	Wool....... 28	Ivory......... 3
Wool......... 4		Ostrich feathers........ 14	Hides, etc..... 3
Hides, etc..... 2		Hides, etc .. 10	Wool......... 1
Eggs......... 1		Mohair...... 4	
5. Forest Products.			
Timber....... 9½	None	Total (bark) 1½	Copra and gums 5
Cork......... 2½			Rubber....... 2
			Lumber....... 2
6. Mineral Products.			
Iron ore...... 5	Total...... 1½	Gold........183	Gold.......... 21
Phosphates.... 2½		Diamonds... 59	Tin........... 3
Zinc ores...... 2½		Coal........ 7	
Lead ore...... 2		Copper...... 2	
		Tin......... 2	
7. Manufactures.			
Negligible	Negligible	Negligible	Negligible

minerals is in accord with the dryness of the climate and the mountainous character of the country, which cause ores to be easily found and often make them abundant. A region which has phosphates for fertilizer, as well as metals, is fortunate.

Here, and in all parts of Africa, the imports are almost entirely manufactured goods, except for a certain amount of coal, lumber, tea, coffee and minor products. Among manufactured goods cotton cloth, clothing, machinery, and other metal work usually hold the highest place. The variety in the imports from region to region is much less than in the exports.

Now compare the products of Egypt and the Union of South Africa with those of the French provinces. Egypt with its preponderance of cotton and cereals illustrates the effect of irrigation and intensive agriculture in a country with deep level soil, great aridity, high temperature, few trees, and a dense population. Egypt has the disadvantage of having only one important cash crop. Irrigation, to be sure, makes the yield of cotton quite steady from year to year and also very large per acre, but that does not prevent great fluctuations in price such as occurred during the Great War, or such as occur when the American crop is unusually large or small. South Africa is no better off, for its exports are negligible in three of the six classes that are represented in Algeria and Tunis as well as in manufactures, while the enormous preponderance of gold and diamonds does not tend toward permanent progress. The South African list shows the effects of aridity, mountains, and recent development, and of conditions adverse to farming.

The Business of the Inactive Part of Africa.—The rest of Africa may be divided into four main sections. First, areas in the north and smaller ones in the southeast are deserts. These are places where business is almost absent, for there are few people and meager agricultural resources. Next comes a band of steppes which border the Sahara on the south in the Sudan, swing around into the peninsula of Eritrea and Somaliland on the east, and reappear surrounding the Kalahari Desert. Here the people are largely nomadic keepers of cattle who do little except supply their own simple needs.

South of the Sudan and along the plateaus of the eastern part of central and southern Africa lies a more important zone of grassland or savanna studded often with trees and in many places cultivated or else supporting a considerable number of cattle. Here live the most active and progressive of the Negro races of Africa. Here, too, the coolness of the high plateaus holds out some hope that the white man may ultimately be able to live permanently. Nevertheless, among the chief products only gold and gums come from this region. Full data are lacking, however, and the table on the preceding page accounts for less than half the exports of the various colonies, no data being available for the rest without an unreasonable amount of search. The savanna regions with their abundant grass, their scattered thickets and groves, and their so-called gallery forests lining the water courses are the home of many of the animals of Africa—the lion, leopard, hyena, and jackal; the elephant, hippopotamus, and giraffe; and most numerous of all, the many kinds of antelopes.

Finally along the equator in the western part of Africa a zone of dense tropical forest represents what most people think of as typically tropical. It is a region where the white man hesitates to live for any length of time for fear of fever, and where the black man is most idle and inefficient. Nevertheless, it yields the two main products of the vast backward portion of Africa, namely, palm nuts and cocoa, for the gold comes almost wholly from Rhodesia close to the South African gold mines.

The Great Business Problems of Africa.—(1) *Transportation.*—A little study of the exports of Africa shows that they practically all come from within less than 400 miles of the seacoast. This is true of everything listed above under French North Africa, Egypt, and South Africa. In the rest of Africa the greatest of all products is the palm nuts which grow along the coasts in equatorial regions. The cocoa and other products of trees and bushes also come almost wholly from the coast and from the outlying islands such as Zanzibar, Madagascar, and Saint Thomas. The difficulty and cost of transportation prevent much trade with the interior. Some railroads have indeed been built but progress is slow. It does not pay to build railways across vast deserts, through deadly forests, and up the side of a lofty plateau unless there is a great demand for the products that the railroads can carry. That is one reason why the completion of the Cape to Cairo railroad is still delayed.

(2) *The Lack of Demand.*—We saw in an earlier chapter that business arises only where there is a demand which can be satisfied by a supply of some kind of goods. In Africa the demand for the goods of the great manufacturing countries of the other continents is very slight. The people live comfortably enough according to their own standards. They do not need expensive clothing, houses, and furniture. They are satisfied with their own kind of food. On the other hand, the demands of the world for the products of Africa are not yet very insistent. What the world wants chiefly is staple products like cotton, wool, wheat, iron, coal, and other commonplace articles. Its demand for these is almost unlimited. But for the articles which the great central part of Africa is chiefly able to supply, such as palm oil, cocoa, ivory, copra, and rubber, the demand is still limited. It can be met more easily in the tropical regions of southeastern Asia, the East and West Indies, and northern South America than in central Africa. Those regions are more accessible than Africa because of the relative length of their seacoasts in proportion to their area. So long as they can supply the world's demands Africa is likely to be neglected. The United States almost completely neglects Africa, the exports to this

country amounting to only 3 per cent of the African total. We satisfy our need for tropical products almost entirely in other regions.

(3) *The Inadequacy of Labor.*—Tropical labor is well known to be inefficient, the reason being largely the actual physical incapacity of the people to work in the northern fashion. With this goes the fact that they have few needs and hence have little desire to work. Africa is particularly handicapped in this respect. The Negro races of tropical Africa will often work much better out of loyalty and affection for their foremen than from any desire for more pay. In fact kindness and good humor will often persuade the Africans to work heartily for long hours when a mere offer of pay or any attempt to compel them to work will have the opposite effect.

(4) *The Health of the White Man.*—The same conditions which make the Negro inefficient weaken the white man. In the old days a popular rhyme among sailors went as follows:

> "Beware of the Bight of Benin.
> Few come out, though many go in."

Even now, with all that has been done in medical science, the white man cannot live permanently on the equatorial coasts of Africa. Whether he can live in the highlands is still a disputed question. Certainly his health suffers there far less than in the lowlands, but it is still doubtful whether there can be any genuine white colonization on a scale such as in South Africa, where there is one white man to four natives, or in Algeria, where the ratio is one to six. Unless there is a fairly large white population it will be difficult for Africa to hold any great place in the world's business, especially while there are such undeveloped possibilities in tropical regions that are more easily accessible. But even if Europeans should settle in Africa there is grave danger that in competition with the black men and under the influence of the unfavorable climatic and social environment many of them would deteriorate into "poor whites." Even in South Africa this has happened to a dangerous degree, and many of the less competent whites are being displaced by blacks. This gives rise to the most serious problem of that dominion. Europe took possession of Africa because of its natural resources on the one hand and the weakness of its political system of the other. And Europe finds that tropical Africa is on the whole a burden. Yet the countries of Europe have been willing to fight for possessions in that continent.

EXERCISES AND PROBLEMS

1. Study the relative advantages of the parts of Africa belonging to various European countries. On an outline map insert the population per square mile from Table 1, apply separate colors or shades to the independent portions and to those belonging to each of the principal powers. Analyze your map to determine the following points: (*A*) What proportion of Africa is self-governing? How does this proportion compare with the proportion belonging to each of the other continents? (*B*) What conditions have promoted independence or caused one European power rather than another to control parts of Africa? (*C*) How do the holdings of the various European countries compare with one another and with the United States in (1) area, and density of population (Table 1), (2) number of large cities (Table 4), (3) total foreign commerce and commerce per capita (Table 39). Sum up your conclusions as to the relative advantages of the European nations in Africa.

2. Adapt Exercises 5, 6, 7, and 8 in Chapter XVIII to Africa so far as possible. Put these exercises into proper form to be given to your classmates.

3. Adapt Exercises 6 and 7 of Chapter XIX to Africa, but in Exercise 7 divide Africa into the relatively progressive north and south parts and the unprogressive center as explained in this chapter.

CHAPTER XXII

AUSTRALASIA AND THE PROBLEM OF ISOLATION

A Comparison between Australia and North Africa.—Australia is much like the part of Africa north of latitude 10° N. Each region has a small section in latitudes higher than 35° where the climate is of the Mediterranean type with rainy winters and dry summers. Equatorward of this in both cases lie dry grasslands which soon merge into vast deserts. Still farther toward the equator grasslands again appear while the lowest latitudes have abundant rain. Both regions are also alike in having an eastern rim of mountains and a west coast which is mountainous in the better portions although the mountains break down where the desert is most intense. Likewise on the poleward coast both Australia and Africa are partly mountain-girt, but have long sections where the mountains are absent and the desert reaches the ocean. Because of the resemblance in climate the two regions are similar in their occupations, their agricultural products, their dependence on animals, their use of irrigation, and many of their exports and imports.

On the other hand Australia has certain advantages arising largely from the fact that it stands isolated in the midst of the ocean. For this reason the east coast of Australia receives abundant rain from the southeast trades, and Queensland is well watered where Egypt is a desert except where irrigated. On the equatorial side of Australia the presence of the ocean likewise causes more favorable conditions of rainfall than in similar latitudes on the southern side of the Sudan and Abyssinia. Again the fact that Australia is smaller than Africa and is not connected with other great land masses gives it a more oceanic climate. This is especially true if New Zealand be included with Australia. Added to all this is the fact that Australia and New Zealand exceed Africa in the area of the portions more than 35° from the equator. New Zealand lying between 35° and 47° south of the equator, is in a different climatic province from Australia, and has the advantage of fairly frequent cyclonic storms, especially during the winter.

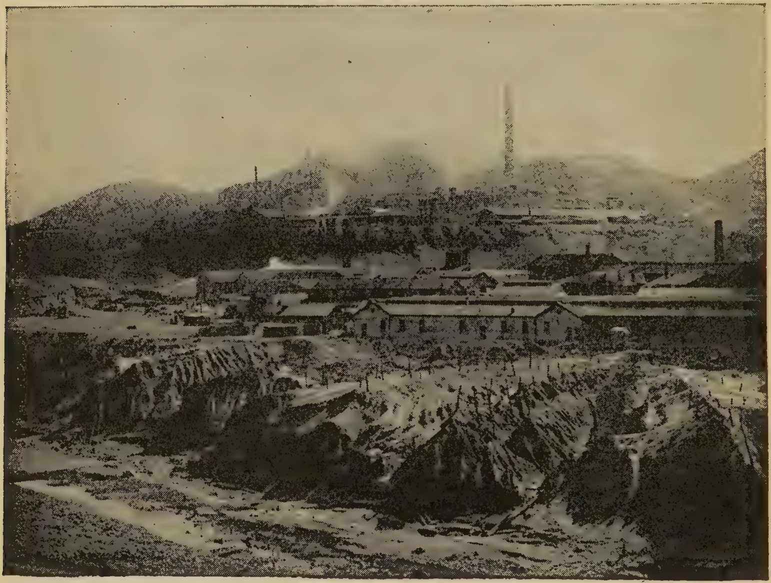
Another advantage of Australia is that although the Australian coast is much less favorable than that of Europe or even North America, it has many more indentations, gulfs, bays, and harbors than that of Africa. Still more important is the fact that when the white man first penetrated Australia, the number of native inhabitants was almost negligible. Hence the continent was open to white colonization. At first the British unfortunately made Australia a penal colony and some highly undesirable elements were thus introduced. Later, however, the type of colonist was unusually high. The great distance of Australia from Europe, and the expense of getting there eliminated many would-be settlers because they had neither the courage nor the means to go so far. New Zealand was especially fortunate in this respect, for many of its early settlers belonged to religious organizations of unusually high character. Because Australia is so completely ocean-girt and can only be reached by a long sea voyage, people other than the sea-faring British have gone there only in small numbers. This fact and the scarcity of natives prevents Australia from having a race problem like that of the English, Boers, and Blacks in South Africa. Thus in the type of inhabitants, as well as in climate, the fact that Australia and New Zealand are isolated from the rest of the world has been an advantage.

The General Conditions of Australasian Business.—Because Australia is inhabited by such homogeneous and competent people, the conditions for business are unusually favorable. This is evident in the progressive laws of Australia, its old-age and invalid pensions, the large cooperative enterprises, especially in New Zealand, and the uncommonly high standards of sanitation and public health. Another factor which has greatly helped Australia has been the rapid development of navigation during the past hundred years. So long as sailing vessels were the only means of reaching that continent, its isolation tended to limit trade and keep the country backward. Today the cheapness and relative speed of steam navigation make it almost as feasible to ship goods from Australia to England as from New York to Tampico. At the same time the airplane is rapidly making it possible to fly from Melbourne to London as quickly as one can go by water from London to New York. Moreover, the telegraph and wireless furnish information to Australia almost as fully and promptly as to any part of the world. Thus, while Australia has reaped the advantages of her long isolation most of the disadvantages are now largely neutralized.

The Nature of Australasia's Business.—The accompanying table gives a bird's-eye view of the exports and imports of Australia and New Zealand, and suggests how the people occupy themselves. The most notable feature of the exports is the great preponderance of animal products, especially wool. Wheat and flour also figure largely in

Australia, but New Zealand turns more to dairy products as is natural in its relatively cool and fairly moist climate. Even in Australia, which is one of the world's famous mining regions, the total production of gold and of all other metals is only a fourth as valuable as the exports of animal products, if we include manufactured as well as unmanufactured goods. Nevertheless, in the high value of its minerals Australia ranks with South Africa, Arizona, and other arid regions.

Another important feature of the Australasian table of exports is that it shows a higher stage of development than prevails in any part of Africa. Australia and New Zealand, to be sure, do not have quite so well rounded a list of exports as has French North Africa, but that is probably in large part because of their newness. But the fact that the Australasian table contains many manufactured products indicates a healthy industrial development. Australasia has not yet reached the stage where it imports large amounts of raw material and carries on complex manufacturing, but it is actively engaged in the simple industries which convert hides into leather; milk into butter, cheese, and condensed milk; and fruits into jams. Such work is probably the forerunner of complex industries, for there is already a beginning along this line. The Australasians have the capacity for such industries



Keystone View Company.

FIG. 69.—Gold and Copper Mines at Mount Morgan, Australia.

FOREIGN COMMERCE OF AUSTRALIA (1918–1919) AND NEW ZEALAND (1919)*

(Millions of dollars)

EXPORTS

AUSTRALIA.		NEW ZEALAND.	
Raw.	Manufactured.	Raw.	Manufactured.
1. Cereals and Vegetables.			
Wheat........ 55	Flour....... 38	Agricultural produce... 4	Negligible
2. Food Products from Trees, Bushes and Vines.			
Negligible	Jams........ 9	Negligible	Negligible
3. Leaves and Fibers.			
Negligible	Negligible	Phormium (New Zealand flax) 4	Negligible
4. Animal Products.			
Total.........258½	Total....... 49	Total.......176½	Total......... 62
Wool.........208	Leather..... 10	Wool....... 95	Butter and cheese....... 53
Hides, etc..... 21½	Tinned meats 18½	Hides, etc... 16½	Preserved meat. 6
Beef.......... 12	Butter...... 15½	Frozen meat. 48	Milk.......... 3
Tallow....... 10½	Milk........ 5	Tallow...... 13	
Mutton and lamb....... 6½		Sausage skins 4	
5. Forest Products.			
Negligible	Negligible	Total....... 3½	Negligible
		Timber...... 2	
		Kauri gum... 1½	
6. Mineral Products.			
Total......... 74½	Total....... 11	Total....... 7½	Negligible
Gold......... 44½	Metal manufactures... 6	Gold........ 6½	
Copper....... 11½	Chemicals and fertilizer... 5	Coal........ 1	
Silver........ 9½			
Tin.......... 5			
Zinc.......... 2			
Coal......... 2			
7. Manufactures.			
Total (see above)............. 107		Total (see above)........... 62	

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* This table is not directly comparable with that of Africa, because prices in 1918–1919 were inflated.

FOREIGN COMMERCE OF AUSTRALIA (1918–1919) AND NEW ZEALAND (1919)—*Continued*

IMPORTS.

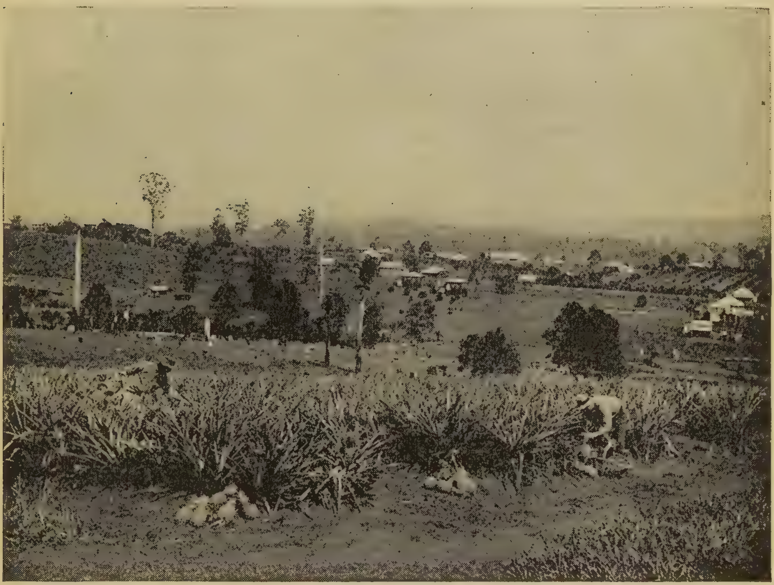
	AUSTRALIA (1918–1919.)	NEW ZEALAND (1919).
Clothing, cloth and allied materials	183	37
Machinery, iron goods and other metal manufactures	72	20
Motor cars	11	11
Books, paper, etc	21½	6½
Drugs, chemicals, etc	21½	5½
Oils	20	6½
Sugar, tea, spirits and fruit	16	12
Tobacco	9	5

and have abundant raw materials which they might well use instead of shipping them five or ten thousand miles and bringing them back in manufactured form.

The list of Australasian imports is remarkable chiefly because of the large values. So long as a people devotes itself chiefly to primary production and to the simpler kinds of manufacturing, the chief imports are usually cloth and clothing; machinery and other iron and steel goods generally come next; while the others in the list follow in varying order. Only in tropical regions such as Queensland, where much of the food of the inhabitants is imported, does the relative importance of the main articles greatly depart from the general rule.

The Problem of a White Australia.—Probably the greatest of all problems in Australia is the question of labor and immigration. Today the number of inhabitants of Australia who are not of the white race is negligible. There is a constant demand, however, for laborers who can stand the high temperature and humidity of the northern parts of the continent and the heat and aridity of the desert interior. The white Australians probably stand these conditions as well as the whites of any part of the world, for the Australian government pays great attention to the health of its subjects, and the deathrate is surprisingly low even in the north. Moreover, even the worst parts of Australia do not seem to be as unhealthful as many tropical regions such as central Africa and the Amazon basin. Nevertheless many of the Australians themselves feel that a large part of the continent can never be a white man's country. The white man can probably live there and prosper so long as he does not attempt to work in the sun. But whether he can permanently live there generation after generation as a regular farmer or in other outdoor occupations is a question. Much of the wealth of Australia lies in the moist northern parts where sugar, tea, coffee, pineapples, oranges, bananas, and many other tropical products can be raised. To develop these northern regions requires labor; and the Australians are confronted by the question, How can that labor be procured?

Most of the Australians insist that their continent remain white. They do not want Chinese, or Hindus, or any other race from Asia or Africa. They are perhaps more intense in this feeling than the people of California and British Columbia. Yet they feel that they must have immigration and that something must be done to develop their vast areas of waste land. The only solution appears to lie in finding out just how tropical climates influence the white man and how the harmful influences may be overcome.



Keystone View Company.

FIG. 70.—Pineapple Farm at Woombye, South Queensland.

EXERCISES AND PROBLEMS

1. Compare Australia and North Africa by preparing the following maps for each region: (*A*) topographic, showing mountains, rivers, deserts, lakes, cities, railways, etc., by conventional symbols, and altitude by colored shading; (*B*) temperature and winds, (*C*) rainfall, and (*D*) vegetation.

Use your maps to test the statements in the first paragraphs of this chapter and state how far the similarity of Australia and North Africa is shown by the maps, and in what particulars there is a divergence.

Where the physical features are similar, to what extent is there similarity in vegetation, density of population, and occupations?

Where the physical features are diverse, what resulting differences do you note in these respects?

2. On a map of Africa and one of Australia and New Zealand indicate the main exports and imports of all ports mentioned in Tables 4 and 40. How do Australian ports and other chief cities compare with those of Africa in (*A*) size, (*B*) distribution and position, (*C*) exports and imports? How far can you account for the differences? How do the imports of the two continents compare in total amount, in amount per capita, and in variety? What are the causes of the differences between the two continents? Base your answer to this last question on statistics so far as possible.

3. Prepare for yourself and for other members of the class a series of problems on the products, industries, business conditions, and special features of Australia.

CHAPTER XXIII

LATIN AMERICA AND THE PROBLEM OF TROPICAL DEVELOPMENT

The Physical Advantages and Disadvantages of South America.—If luxuriance of vegetation determined progress, South America would be the most fortunate of the continents. Its good fortune would be shared by most of Central America, the West Indies, and Mexico as far north as the Tropic of Cancer. Nowhere in Latin America except among the lofty mountains and in the far south is the temperature too low for luxuriant vegetation. The arid areas are also relatively small. Aside from the desert of northern Mexico, which is far smaller than the corresponding deserts in the Sahara, Arabia, and Australia, the dry regions are largely confined to narrow belts west of the mountains in latitudes below 20° and to a somewhat broader strip in the Andes between 20° and 30° south latitude and to a similar strip east of the Andes south of latitude 30°.

Unfortunately a climate which fosters abundant plant life is not necessarily good for man. In much of the tropical part of South America and to a considerable degree in the North American and West Indian parts of Latin America, the very luxuriance of the vegetation is a hindrance. It makes transportation extremely difficult, the rapid growth of wild plants makes it hard to keep the weeds from choking the crops, and the damp recesses of the forests provide shelter for myriads of mosquitoes and other noxious insects. Moreover, the climate itself in the greater part of Latin America makes the native population inefficient, and subjects people of European race to the risk of serious breakdown unless they frequently recuperate in more bracing regions. No other continent except Africa finds its climate so much of a hindrance as does South America.

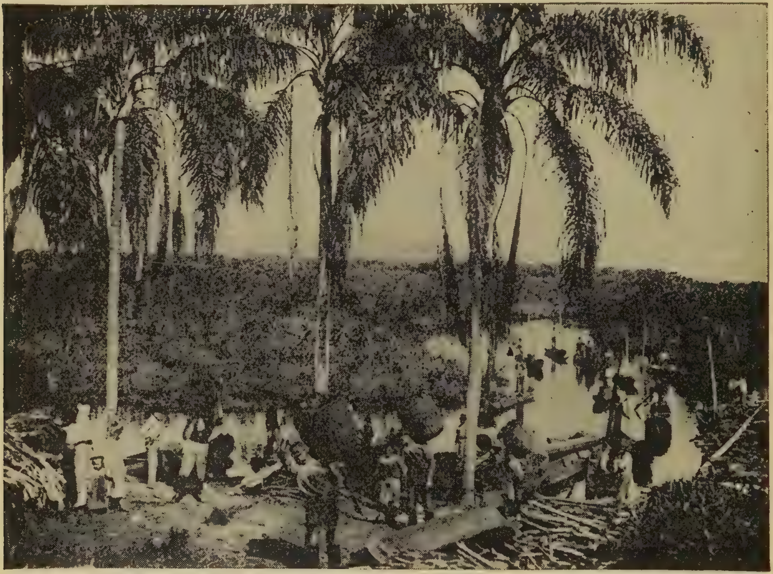
The relief of Latin America, like the climate, has both disadvantages and advantages. On the west the unbroken ranges of the lofty Andes have the unfortunate effect of completely shutting out oceanic influences and isolating a narrow Pacific coastal strip from the rest of the continent. South of latitude 30° where the temperature is favorable, mountains cause aridity in a large section of Argentina which would be well watered if the wet west winds were not shut out by the Andes. Moreover, southeastern Brazil, including the famous coffee region, is mountainous and difficult to cross, and so is much of Central America and Mexico. On the other hand, broad lowland plains border the Atlantic Ocean at the mouths of the Orinoco, Amazon, and La Plata rivers. Since these plains coalesce in the interior it would seem as if communiation ought to be easy all the way from Venezuela to Patagonia. Such is the case along the water courses, for the Amazon permits sea-going commerce to reach Manaos, or even Iquitos nearly two thousand miles up stream, and gives a good waterway to the very foot of the Andes. The La Plata and Orinoco likewise provide valuable waterways. If all the rivers in the plains of South America were deepened and straightened and supplemented by canals the continent would have a wonderful system of inland waterways. Elsewhere, however, the luxuriance of vegetation often makes travel as difficult as among high mountains.

In soil and mineral resources Latin America is much like Africa. The soil is wonderfully rich where the climate is dry, but may be leached and deficient in soluble plant food where the rainfall is abundant. Mineral wealth is not abundant as a rule, although the dry regions of Mexico, Peru, and Chile are rich. No great supplies of iron have been developed although fine ore is reported. Coal is scarce, the total production from Mexico to Cape Horn being not much over two million tons per year or as much as the state of Arkansas. Most of this small amount comes from Chile, Peru, or northern Mexico. The petroleum in Mexico is the only known supply of fuel on a large scale. But that lies close to the United States border and benefits this country and England vastly more than it benefits Latin America. Nevertheless, Latin America is probably no worse off in soil, minerals, or climate than are other parts of the world in corresponding latitudes, while the southern section including Argentina, Chile, Uruguay, and part of Brazil has important advantages.

The People of Latin America.—As soon as one crosses the Rio Grande or the strait between Florida and Cuba one is conscious of a great change not only in language and government, but in habits, modes of life, and methods of business. This change is much like that experienced in going from the northern to the southern side of the Mediterranean. So far as business is concerned some of the more noteworthy characteristics may be summed up as follows: (1) less energy and push than among the typical business people of the United States; (2) greater courtesy, willingness to wait or be discommoded for the sake of others, more sensitiveness to little personal deeds of thoughtfulness or thoughtlessness; (3) less respect for contracts and especially for apparent promises made in conversation. This last arises largely from the fact that Latin Americans are usually so polite that they do not like to contradict, and often seem to assent or to make promises as a matter of courtesy, expecting that the other person will understand. (4) Almost everything in Latin America moves slowly, and the payment of bills follows this rule. The Latin American allows others to be slow in paying him, and expects to be allowed plenty of time himself. If this is once understood, it makes business far easier. (5) Graft is generally supposed to be even more common in Latin America than in the United States, and it is more or less recognized as legitimate. The officials are especially prone to graft, partly because many are so poorly and often so irregularly paid. (6) Unwillingness to abide by the will of the majority, which leads to frequent revolutions and makes it difficult to organize large business enterprises. (7) A relatively superficial education. Few business men in Latin America have had a college education, and specialists and experts are rare. (8) Lack of self-control. This is due largely to lack of physical vigor. It leads to a good deal of excited talk and gesticulations which have little importance when once the northern business man learns to understand them and be patient with them.

These characteristics are by no means equally strong in all parts of Latin America, nor do they pertain to all classes. They belong primarily to the people of Spanish, or in Brazil, of Portugese extraction, often with a certain amount of Indian blood, whose ancestors have been in America for some generations. They are most strongly developed in the equatorial countries. In Chile, Argentina, and Uruguay they largely disappear or at least are much modified. In those countries the immigration of Italians and Spaniards by the hundred thousand, and of other Europeans in smaller numbers gives a different aspect to the population, even though the old Chilean stock is about half Indian and half white.

A true knowledge of a country demands good understanding not only of the business men whom we have just considered, but of the laboring classes and farmers. In all the mountainous countries from Mexico to Peru and Bolivia the lower classes are largely Indians with more or less mixture of Spanish blood. In spite of marked differences, their outstanding traits are a sort of dull, slow stolidity which makes it very hard to arouse their interest or enthusiasm or to get them to work or to do anything in any way except the slow and often clumsy fashion of their forefathers. In the West Indies and along the eastern coast to Brazil most of the lower classes are either Negroes or mixtures of the Negroes with Indians and Spanish. The Negro types are much less stolid than the Indians, more merry and responsive, and pleasanter to deal with, but they do not work hard and tend to loaf and enjoy life unless the mere needs of existence force them to work. In the southern countries, however, including southern Brazil, the farmers, cattle raisers, and laborers are largely of Spanish, Portuguese, and Italian origin, and are much better workers than either the Indians or Negroes. In the center of South America from southern Venezuela to Paraguay, the inhabitants are largely wild tribes of Indians who know no Spanish or Portuguese, and who live by the most primitive type of agriculture and by hunting and fishing.



Keystone View Company.

Fig. 71.—Gathering Dye Wood in Brazil.

The Types of Business in South America.—As one goes from south to north in Latin America the character of the business activities changes notably, as may be seen in the accompanying table of exports. Argentina, with its exports of cereals and other agricultural products worth $424,000,000 in 1919, and of animal products worth $529,000,000, ranks among the greatest of the world's food-supplying countries. The fact that it can raise such vast quantities of wheat, barley, corn, and vegetables and an enormous number of horses, cattle, and sheep shows that its people are active. They have not yet reached the point, however, where they seek to raise raw materials for their own use in manufacturing. They raise enormous quantities of flax for example, but only for seed, not fiber. Argentina's mineral resources are only moderate so far as yet discovered, and its forests are largely of poor bushy types. Some manufacturing of a simple kind such as meat packing has begun, but progress along this line is by no means so great as in Australia and New Zealand. Nevertheless, the prospects for a satisfactory all-around development are excellent. The fact that Argentina will probably long continue to be a great exporter of staple food products is important for the United States, for with our rapid growth in manufacturing the time may not be far distant when the eastern states will import large quantities of food by sea.

APPROXIMATE EXPORTS FROM SELECTED PARTS OF LATIN AMERICA, 1919 *

(In millions of dollars)

	Argentina.	Uruguay.	Chile.	Brazil.	Ecuador and Peru.	Venezuela and Colombia.	Honduras, Salvador, Guatemala, Nicaragua.	Cuba and Jamaica.	Mexico.
1. Cereals and vegetables........	424	1	24	...	...	...	...	...	...
2. Plantation food products (coffee, tea, sugar, cocoa, bananas)......	...	...	...	415	45	84	45	431	21
3. Leaves and fibers (cotton, tobacco)........	...	...	...	33	27	...	...	46	41
4. Animal products	529	50	13	62	7	11	3	...	10
5. Forest products (including rubber)..........	25	...	1	30	...	...	4	4	1
6. Mineral products...........	18	...	67	...	28	4	...	...	107

* Data from the Statesman's Yearbook, 1921. The year 1918 is employed for Cuba and Mexico. Exact division of Mexican products uncertain.

In Uruguay the $50,000,000 of exports of animal products against only a million dollars' worth of cereals and a negligible quantity of other products indicate an extraordinary reliance on a single resource. The Uruguayans, to be sure, now raise enough food to supply their own wants, except in the matter of luxuries, although a few decades ago such was not the case. Their economic condition suggests that of the Boers on the plateau of South Africa in about the same latitude, or of the cattle men in northern Mexico, but the abundant rain and fine pasturage even in the drier seasons give Uruguay a great advantage. So, too, does the fact that Uruguay as well as Argentina and Chile contains only a few Indians and is now receiving a large immigration of Italians, Spanish, and other Europeans.

In Chile the table shows a condition which we frequently find repeated in countries having large dry areas, namely a great development of minerals. Nitrate of soda is not only Chile's most important article of export, but an export tax makes it the chief source of revenue. In copper production Chile stands next after the United States. Animal products and cereals are also fairly prominent exports, as in most countries with the Mediterranean type of winter rains and summer droughts. South of the regions where most of the Chileans now live there are extensive forests in a climate with abundant and in many cases excessive rain at all seasons. In fact in latitudes above 40° the heavy rainfall and low summer temperature because of the winds from the Pacific make it improbable that a large agricultural population can ever find a living. Across the mountains in the Patagonian part of Argentina, although the summer temperature as far south as latitude 45° is high enough for profitable agriculture, the scanty rainfall due to the cutting off of the west winds by the Andes interposes another barrier to progress. Thus the part of South America south of 40°, corresponding to the parts of North America and Europe where business is most active, is scantily populated and little developed, while the region from 30° to 40° S. is the seat of the greatest activity.

Now contrast Brazil with the three southern countries of South America. A great change is apparent corresponding to the more tropical character of the climate. Cereals and vegetables drop out of the list of exports, as do minerals. Animals, though still important, hold no such place as in Uruguay and Argentina in proportion to the population. On the other hand, food products derived from tropical plantations become enormously important. About $354,000,000 of the $415,000,000 in this part of the table of exports must be ascribed to coffee alone, with smaller amounts for sugar, yerbe maté, and cocoa. Leaves and fibers, chiefly tobacco and cotton, also become prominent. In Brazil there is likewise a moderate amount of India rubber, which is classed as a forest product in the table, although in the East Indies it is rapidly becoming a plantation crop which might be placed with cotton and tobacco.

In the Andean countries of Ecuador and Peru, just as in Brazil, the effect of the tropical climate is evident in the plantation food products, chiefly cocoa in Ecuador and sugar in Peru, and in the leaves and fibers, which here mean chiefly Peruvian cotton. All the main exports of vegetable products from the Andean countries come from their warm lower portions. Only in the exports of minerals, which are chiefly the copper, petroleum, and silver of Peru, do we see the effect of the mountains. These countries, like practically all others, have many minor exports, but here we are considering only the main articles which are produced in sufficient surplus to be important for world commerce.

Passing on to the northern countries of South America the table shows that in Venezuela and Colombia plantation food products assume almost as preponderating a place as do animals in Uruguay. Coffee is by far the chief export ($77,000,000 in 1919), with cocoa coming second in this group and bananas third. In the small Central American countries the same conditions are still more marked. Finally in the islands of Cuba and Jamaica the plantation system reaches its highest development, for there the exports are practically all plantation products, either foodstuffs among which sugar is far and away the most important, or tobacco. The high development of plantations in the northern parts of Latin America is partly because of the tropical climate and partly because this region is so near the densely populated parts of the United States where the demand for such products is great. In Mexico plantation products still play an important part, for sisal fiber accounts for about $40,000,000 among the group called "leaves and fibers," while sugar figures among the exported food products. Minerals, however, rise to great importance just as they do far to the south in Peru and Chile. Petroleum accounts for about half the mineral exports of Mexico, but most of the other important minerals aside from coal and iron are well represented.

The Contrasted Imports of North and South.—In the matter of imports the countries of Latin America show the same marked contrast as in exports. This is evident in the following table which shows the approximate annual imports per capita.

Argentina and Chile, 1919.		Cuba and Jamaica, 1918–1919.
Textiles and clothing	$21.10	$12.90
Machinery, metal manufactures, etc	10.70	17.95
Foodstuffs	8.45	36.60

The people of Argentina and Chile buy large amounts of clothing, for they are comparatively well to do, but have few factories. The Cubans and Jamaicans buy only a little over half as much, not merely because in their warmer climate they need less variety, but because they are not so well off. On the other hand, the farmers and cattle raisers of the southern countries do not need so much machinery and metal wares as do the sugar planters of the northern islands with their mills, tramways, and other appliances. When it comes to food, the people of the far south are practically self-supporting. Aside from sugar and coffee, the imports are luxuries which are not essential to existence. The islanders, on the contrary, do not raise enough to support themselves. They are so busy producing sugar, tobacco, and cocoa that they must import about four times as much food per person as do the Argentinians and Chileans. In other words the people of the southern countries of South America display a healthy economic system in which they feed themselves, send staple food supplies to other countries, develop simple manufactures, and run their own business in such a way that gradually they are likely to become more and more independent of other countries. As one comes north in Latin America, however, the plantation system becomes more and more firmly established. The people do not raise enough food for themselves, they largely produce luxuries or products of secondary importance rather than necessities, they depend on outsiders for guidance and capital in their simple manufacturing, and their dependence on other countries becomes steadily greater.

The Distribution of the Tropical Commerce of the United States.—The importance of the trade between tropical countries and those of higher latitudes is steadily growing. This is natural in view of the differences in the products of the two regions and the increasing demand of prosperous manufacturing regions for raw materials and luxuries from warm countries. The way in which the tropical trade of the United States is distributed among the various continents and the extent to which it increased from 1913 to 1919 appears in the following table:

EXPORTS AND IMPORTS OF THE UNITED STATES FROM TROPICAL COUNTRIES

N.B.—All of Mexico, Brazil, Paraguay and India are reckoned as tropical as are all parts of Africa except Algeria, Tunis, Morocco, Egypt, and the Union of South Africa.

Tropical Regions of	Exports.				Imports.				Exports and Imports.		
	1913–14.		1921.		1913–14.		1921.		1913–1914.	1921.	
	Millions of Dollars.	Per Cent of U.S. Total.	Millions of Dollars.	Per Cent of U.S. Total.	Millions of Dollars.	Per Cent of U.S. Total.	Millions of Dollars.	Per Cent of U.S. Total	Millions of Dollars.	Millions of Dollars.	Per Cent of Increase,
	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.
Africa	22.2	0.9	39.7	0.9	4.3	0.2	16.3	0.6	26.5	56.0	53
South America	56.3	2.3	123.1	2.7	142.4	7.2	176.3	6.6	198.7	299.4	51
Asia	135.7	5.5	233.2	5.0	47.6	2.3	146.4	5.4	183.3	379.6	107
North America and W. Indies	210.7	8.6	590.2	12.7	299.7	14.9	489.1	18.2	510.4	1079.3	112
	424.9	17.3	986.2	21.3	494.0	24.6	828.1	30.8	928.9	1814.3	

In 1913–14, during the last normal year before the war, the United States sent $22,200,000 worth of goods to tropical Africa, an amount which was nine-tenths of 1 per cent of our total exports. In 1921, when conditions were settling back to normal but were still a good deal disturbed, this country sent $39,700,000 worth of goods to tropical Africa, an amount which was the same percentage of the total as in 1913–14. If Europe had been in a normal condition in 1921 and had been able to buy as much as usual, Africa's percentage would probably have been less, so that our exports to Africa are relatively falling off. On the other hand the imports of tropical products from Africa rose from $4,300,000 to $16,300,000, but even in 1921 amounted to only 0.6 per cent of the total, so that the trade of the United States with tropical Africa is almost negligible. In columns I and J, imports and exports have been added together, while the last column shows the percentage by which the actual value of the total trade with the United States increased from 1913 to 1921. Since prices in 1921 were more than 60 per cent higher than before the war, a percentage of 53 in the last column means that the total trade of the United States with tropical Africa in 1921 was essentially the same as in 1913, with perhaps a little falling off because of hard times in the later year.

Applying the same kind of reasoning to tropical South America it appears that the exports of the United States to the part of South America north of Chile, Argentina, and Uruguay increased from 1913 to 1921, but imports from these regions showed a relative decline from 7.2 per cent to 6.6. The net result was that the total volume of business (both exports and imports), between the United States and the tropical part of South America remained nearly steady just as did the African business, for the increase in prices accounts for the seeming gain of 51 per cent.

The high figures for the business of the United States with the tropical parts of Asia and North America indicate that southeastern Asia and the East Indies on the one hand, and Mexico, Central America, and the West Indies on the other hand, are the great sources of tropical products for the United States. They are likewise the chief sources for Europe. Moreover, there was a real increase in the trade of the United States with these two regions, as is indicated by the large percentages in the last column. If we exclude from the North American figures an increase of about fifty million dollars in the importation of petroleum from Mexico, on the ground that petroleum is not in any special sense a tropical product, the figure for North America in column K becomes 102. This means that while the actual volume of the trade of the United States with Africa and South America remained almost stationary from 1913 to 1921, the volume with Mexico, Central America, and the West Indies increased about one-fourth, while with Asia the increase was even larger.

Why Commerce with South America Increases more Slowly than with other Tropical Regions.—The figures given in the preceding table show that while in 1913–14 the total trade of the United States with tropical South America ($198,700,000) exceeded that with tropical Asia ($183,300,000), in 1921 the figures had been reversed ($299,400,000 for South America against $379,600,000 for Asia). In view of the relative nearness of tropical South America to the United States and the constant attempts during the last few decades to stimulate South American trade, these facts present one of the most important business problems for both the United States and South America. A study of the relative importance of the tropical products imported into the United States in 1913 and 1920 will help in understanding this.

CHIEF TROPICAL PRODUCTS IMPORTED INTO THE UNITED STATES

Article of Import.	Value (1913) per Statistical Abstract.	Approximate Amount, 1920.	Amount in 1920 Expressed in Percentage of 1913.
(1) Sugar and molasses	$163,350,000	9,489,300,000 lb.	144
(2) Coffee	119,450,000	1,417,063,000 lb.	163
(3) India rubber	97,630,000	566,546,100 lb.	430
(4) Fibers (hemp, sisal, etc.)	45,170,000	771,072,000 lb.	104
(5) Vegetable oils	20,090,000	260,041,000 lb.	164
(6) Cocoa and chocolate	18,180,000	344,986,000 lb.	217
(7) Tea	17,430,000	90,247,000 lb.	101
(8) Fruit (bananas)	15,400,000	39,319,600 bun.	85
(9) Gums	15,170,000	142,341,000 lb.	155
(10) Cabinet wood	7,380,000	67,000 M ft.	74
(11) Spices	6,190,000	60,918,000 lb.	104
(12) Rice	6,100,000	142,951,000 lb.	57
(13) Nuts	5,000,000	299,907,000 lb.	667
(14) Dyewoods	2,900,000	269,000,000 lb.	149
(15) Ivory	2,800,000	667,500 lb.	93
(16) Sago, tapioca	1,190,000	....	...
(17) Indigo	1,100,000	919,000 lb.	11
(18) Quinine (bark)	360,000	4,067,000	145
Total	$544,890,000		

Among these products sugar and molasses are already so widely used that a rapid increase in production is not needed. The increase of 44 per cent in imports from 1913 to 1920 was largely due to the disturbances of the Great War which caused this country to refine sugar for countries that formerly bought from Central Europe. The growth in the demands of the United States can be supplied with comparative ease by opening new plantations in Cuba and the other parts of the West Indies and Central America where the industry is already well established, and where there is a fairly large labor supply. The demand for coffee, the main tropical import from South America, increased rapidly perhaps because of prohibition, but it is doubtful whether this will continue. On the other hand, the increased use of automobiles and the utilization of rubber in many other industries is causing the demand for rubber to increase enormously in spite of fluctuations from year to year. Formerly nearly half the world's rubber came from Brazil, but most of it was from wild trees. To supply the present demand huge plantations are needed, and these have been established in the East Indies not only because the climate is favorable but because of the large supply of fairly good labor. Moreover, trade and investments follow the flag, and European flags fly all over southern Asia and the East Indies.

The need of the United States for fibers such as hemp and sisal for use in making rope and twine has not increased much more rapidly than the population during the past twenty years. The same is true of the demand for tea, and spices, while the demand for bananas, rice, and indigo has actually diminished. Certain other products including cabinet woods and ivory are imported in smaller quantities than formerly because the easily available supply is depleted. The tropical articles for which the demand is increasing—and will apparently continue to increase significantly—are rubber, vegetable oils made largely from palm nuts, cocoa and chocolate, gums, nuts (especially coconuts), dyewoods, and quinine. South America might supply all of these, but they demand steady plantation labor. South America has a labor supply which is both poor and scanty. The Indians, as we have seen, are not good workers. The Negroes and the mestizos or mixed Spanish and Indian stock are generally considered more competent but cannot be relied upon. They work today and loaf tomorrow, which is one reason why tropical Africa and South America play so small a part in the world's business. The best tropical labor in the world appears to be that of the rice-raising and millet-raising people of southeastern Asia and the East Indies,—the Hindus, Chinese, Malays, Javanese, and others. The 20,000 Hindus brought by the British to Jamaica and the 130,000 in British Guiana are among the reasons why the production of those regions is relatively large. The Asiatics and East Indians are perhaps not so strong man for man as the Negroes and Latin Americans, but they are more docile, easier to handle, and as the result of living for generations in regions of dense population are much more steadily industrious. Since southeastern Asia contains a vast reservoir of relatively reliable tropical labor while South America contains a much smaller supply of less reliable labor, South America is at a disadvantage for all plantation products which can stand long transportation. In the old days when it was a question of finding wild rubber, wild gums, wild quinine, the Indian was as good as the Hindu, but now when transportation is cheap and plantations are the order of the day, the Hindu, the Chinese, and the East Indian labor supply is a great asset. Thus the supply of plantation products for the United States tends to come more and more either from southeastern Asia because of the labor supply, or from Central America and the West Indies because of nearness plus a labor supply poorer than that of Asia, but better than that of tropical South America.

EXERCISES AND PROBLEMS

1. On a map of Latin America outline areas of (*A*) tropical forests; (*B*) semi-arid grasslands; (*C*) deserts; and (*D*) great altitudes; shade the remaining area. How does this area compare with corresponding areas on similar maps of the United States, Europe, and Africa?

2. The relative scarcity of population in South America. List all the countries of the world which have a population (*A*) more than that of all South America, (*B*) half as large. How does the density of population in these countries compare with that of South America?

On a map of South America shade lightly the countries having a density of under 10 per square mile, and heavily those with a density of 10 to 17. (Table 1 C.) Do the same for the United States (Table 2 C), Europe, and Africa (Table 1 C), and draw comparisons. Explain the causes of the sparsity of population in South America. What effect has density of population on business? How is the sparsity of population in South America evident in Table 4?

3. As a source of agricultural products, how does South America compare with the United States? Use Tables 1 B and 2 B as a basis for deciding how the production of South America would compare with that of the United States if the efficiency per farmer were the same.

Suppose that the number of farmers in the United States is 50 per cent larger than in South America. Then in Table 11 A, if the production per farmer in the United States were the same as in South America, the production of the United States according to the ratio of the number of farmers would be about 273 million bushels, but actually the ratio is 10 times as much. Find a similar ratio for each crop, and also for the animals of Table 14. In what sort of farm products does South America fall far behind the United States? In what is its production per farmer about like ours, and in what does it far excel? Explain the causes of this.

4. Discuss the products named in this chapter which South America produces abundantly and the United States not at all or in insignificant amounts. Explain their climatic optima, their mode of production, and the economic or other conditions which help to cause them to occupy a different place in the United States and South America.

5. On a map of Latin America draw heavy vertical lines proportional to the production of each country in vegetable food products, lumber, minerals, and animal products, or if desired, use the classification in the table in this chapter. It may be

necessary to translate the items of the tables into the same units (the value). How does your map compare with a similar map of Africa or the United States? Consider the possible future development of the Latin-American areas, in view of the physical features and present products.

6. What justification is there for the widespread idea that South America is rich in minerals? From Table 25 make a list of the minerals produced in South America in amounts corresponding to the following percentages of the production of the United States: (*A*) over 100 per cent; (*B*) 50–100 per cent; (*C*) 10–50 per cent; (*D*) 1–10 per cent; (*E*) not at all. Find how far the low figures in South America indicate lack of resources and how far lack of exploitation. The Atlas of Commercial Geology published by the U. S. Geological Survey will help you.

7. Select the four or five cities and four or five natural features that especially interest you in Latin America. Plan an itinerary to include them all. Obtain steamship and railroad folders where possible and estimate the time needed for your journey. Describe the types of business with which you would chiefly come in contact in each region.

8. Get as much information as possible about the manufacturing of South America compared with that of the United States. Use the tables in this chapter and Table 30 at the back of the book. Try to classify the manufacturing industries of South America as given in ordinary books of reference according to whether they are primitive, simple, or complex. Where does each kind occur and to what extent?

9. Study the relative excellence of the systems of transportation and communication in the various countries of South America. Prepare an alphabetical list of the South American countries and make a table from the figures given in each of the following columns, 33 B, C, E, F, H, and 34 B and D. Prepare a second table of the same kind, but instead of the figures from the tables in the book insert the rank of the different countries and in the first table on a scale from 1 to 10, as can easily be done by study of your first table. Add the ranks of all columns for each country and put the sum or average in a final column. A low figure will mean that on the whole the system of transportation and communication is good. Use your results as the basis of an isopleth map. Interpret your map and its relation to business.

10. Compare the amount of foreign commerce in different parts of South America with the systems of transportation and communication. From Table 39 B and G combined draw an isopleth map of the per capita foreign commerce of South America. Do the same for the per capita commerce and with the United States, Table 39 E and J. Compare these maps with one another and with the map of Exercise 5. How do you explain their resemblances and differences? Does active commerce cause the development of systems of transportation, or do transportation and communication systems cause commerce, or do other cause give rise to both? Discuss this whole question, and prepare a written report on it, illustrating your report with other maps not mentioned in this exercise.

11. Repeat Exercises 1 to 6 using Central America, the West Indies, and Mexico, instead of South America.

12. Make a study of an individual country product, activity, or business opportunity in South America along the general lines of Exercises 5, 6, 7, and 8 in Chapter XVIII.

PART IV

THE BUSINESS OF THE UNITED STATES AND CANADA

CHAPTER XXIV

INDUSTRIES WHERE MAN ROBS NATURE

The Natural Advantages of the United States.—No other large country rivals the United States in wealth. Before the Great War the average wealth per capita was over $2000, and now, because of the increase in prices, it is about $3000. Argentina, Australia, Great Britain, France, and Canada with pre-war averages of $1500 to $1600 per capita come next, but the Great War impoverished the European countries so that today their wealth per person is probably only about half that of the United States. The cause of such a concentration of wealth is one of the great geographical questions. Why is the wealth per person in the United States, even under normal conditions, a third more than in the most progressive parts of Europe, ten times as great as in Japan, and probably fifteen or twenty times as great as in China?

The answer lies chiefly in four conditions: (1) the racial and social inheritance of the inhabitants, (2) the absence of any large settled aboriginal population, (3) the excellent climate, and (4) the great and undeveloped natural resources of a new country.

(1) The original colonists were largely a picked group with uncommonly high ideals and strong characters. The Pilgrims, Puritans, Quakers, and Huguenots thought for themselves and did what they believed right even when others opposed them. They not only brought to America some of the best ideas of Europe but had other ideas of their own. Many other early immigrants had the thrift to save money for a long, hazardous and expensive voyage, and the courage and love of adventure that made them willing to face the hardships of the wilderness. In later years these higher types of immigrants have been diluted by people of less ability, who were poor or unhappy at home and hoped here to find wealth and comfort. Today Canada receives a much

higher type of immigration than the United States, for it carefully weeds out the unfit by inspection in their own homes. Nevertheless, the people of the United States as well as Canada are still of relatively high quality because a large proportion are descended from Europeans who had more than the average ability and character.

(2) The immigrants to temperate North America were fortunate in going to a region where the population was sparse and also nomadic. When an advanced race settles among an aboriginal race having different ideals and lower standards, as in Mexico, Peru, and South Africa it almost inevitably is held back or deteriorates. Fortunately for the United States and Canada, the scanty Indian population consisted largely of hunting tribes who moved westward as the white man advanced. Hence, except where the mistake was made of introducing slaves and later of fostering a poor type of immigration, these countries have been free from racial handicaps such as are the bane of South Africa and much of South America.

(3) The United States and southern Canada contain the only great section of the world where the climate rivals that of Europe in its combined advantages for both agriculture and man. Agriculture is almost incalculably benefited by having sufficient rain at all seasons and relatively little variation from year to year. Man, as appears in Chapter VI, has the best health and most energy in a climate with storms at all seasons and with a strong but not excessive contrast between summer and winter.

(4) A country with the preceding advantages is just the place where abundant undeveloped natural resources are most important, especially if transportation is easy. In North America, when the white man first came, the greatest resource was the virgin soil, especially in the central plains. The other natural resources are chiefly the minerals, forests, and fish. These last three are the subject of the rest of this chapter; they give rise to the industries which most ruthlessly rob Nature of her wealth without putting back anything in return.

The Mineral Wealth of North America.—In the accompanying table compare the percentage of the world's production of minerals derived from each continent in 1913, with the corresponding percentages of population in the bottom line. In North America only graphite, magnesite, manganese, tin and platinum are produced in quantities less than would be expected if production depended solely on the number of people. The same is true of the United States except that antimony must be added to the exceptions. In 12 of the remaining 17 products the percentages for North America are more than four times the percentage of population. The only important mineral products in which any continent except Europe excels North America are antimony, gold, tin, and tungsten. In proportion to the population, the production of minerals in North America, and especially in the United States, exceeds that of every other continent. In known mineral reserves, as opposed to mineral production, North America similarly leads in many respects, although here we cannot speak so positively. But even though large discoveries should be made in other continents, North America, and especially the United States, will not easily lose their high rank.

APPROXIMATE PERCENTAGE OF WORLD'S MINERAL PRODUCTION BY CONTINENTS, 1913

Mineral.	Africa.	Asia.	Australasia.	Europe.	North America.	South America.	United States.
Aluminum	..	..	..	55	45	..	38
Antimony	1	52	4	31	11	..	..
Asphalt	..	..	..	46	54	..	7
Bauxite	..	..	..	60	40	..	40
Coal	1	4	1	54	40	..	39
Copper	2	8	5	13	65	7	56
Gold	45	7	13	6	27	3	19
Graphite	5	28	..	57	6	..	4
Gypsum	1	1	..	40	58	..	47
Pig iron	..	..	..	69	41	..	40
Lead	4	3	20	30	43	..	36
Magnesite	..	3	..	95	2	..	2
Manganese	..	36	..	59	1	5	0.16
Nickel	..	..	11	4	85	..	2
Petroleum	..	4	..	21	72	1	65
Phosphate	37	10	7	8	45	..	45
Platinum	..	..	1	93	1	6	0.6
Pyrite	3	2	..	90	8	..	6
Silver	..	3	8	7	76	6	30
Sulphur	..	6	..	42	51	1	51
Tin	4	67	5	4	..	20	..
Tungsten	..	30	13	23	17	15	17
Zinc	4	4	16	38	37	..	36
Population	7.8	51.5	0.4	28.2	8.6	3.5	6.3

The Relative Importance of Mineral Products.—The importance of mineral products is almost incalculable. The discovery of how to smelt iron ranks with the introduction of speech, fire, tools, domestic animals, agriculture, and the wheel as a great epoch in human progress. Nevertheless in 1919, the year covered by the Census of 1920, the mineral wealth produced in the United States was worth only $4,613,000,000 compared with 20 billion for farm products, and 25 billion as the value added by manufacturing. Indeed, the mineral production that year was less valuable than two great crops, corn ($3,850,000,000) and wheat ($2,000,000,000). Thus, important as minerals are, they cannot compare either with the soil or with human labor as a source of wealth.

Mineral products fall naturally into three classes: (1) fuels, (2) metals, and (3) quarry products which include those like sand and gravel that are dug from pits, and certain minor non-metals that are mined. The accompanying table shows that the fuels are worth twice and the quarry products half as much as the metals. Ordinary stone produced in the United States is worth one and one-half times as much as silver or gold, while sand almost equals lead.

VALUE OF MINERALS PRODUCED TO A VALUE OF OVER $25,000,000 IN THE UNITED STATES IN 1919

(Expressed in millions of dollars)

Fuels.		Metals.		Non-metals.	
Bituminous coal	1170	Pig iron	777	Clay products, brick, etc.	268
Petroleum	775	Copper	239	Cement	147
Pennsylvania anthracite	365	Zinc	66	Stone	93
Natural gas	162	Silver	64	Sand	42
Natural-gas gasoline	64	Gold	60	Lime	28
Other (peat)	1	Iron alloys	47	Salt	27
		Lead	45	Mineral pigments (semi-metallic)	26
		Aluminum	39	All other	93
		All other	16		
Total	2537	Total	1353	Total	724

The Distribution of Mineral Industries in the United States.—The distribution of mineral production in the United States is shown in Fig. 72. The fuels cause the enormous concentration in Pennsylvania and West Virginia, and also immediately to the west as far as Illinois. That region produces not only all the anthracite coal and the main part of the bituminous, but also considerable supplies of petroleum and natural gas. Probably no other part of the world is so well supplied with high-grade fuel. A less important concentration of fuel appears in Kansas and Oklahoma, where there is a fair production of coal and a huge production of petroleum.

The metals of the United States show two areas of abundant production: (1) the iron and copper region near Lake Superior, and (2) the

Rocky Mountains and Sierras, which produce chiefly copper, lead, and zinc, and the precious metals. A minor area is the lead and zinc region of Missouri. Quarry products, on the other hand, are distributed quite evenly over the country. In a general way their value bears a fairly close relation to the density of population and the activity of business. Quarrying, like agriculture, is a relatively universal occupation, not only in the United States but in almost all well-inhabited countries, except plains with deep soil and tropical regions with a dense cover of vegetation. In the United States, however, its products are worth only about a thirtieth as much as the agricultural products.

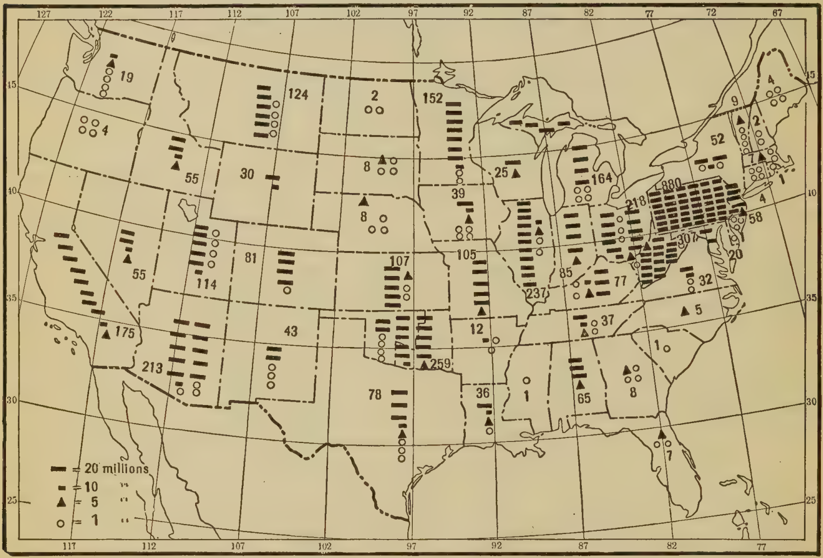


FIG. 72.—Total Value of Mineral Production in the United States, 1917.

The value of the output of minerals per person in various regions varies enormously more than the similar value in agriculture or manufacturing. This is due to great differences in (1) the richness of mines, (2) the depth at which the ore is dug, (3) expenses in draining and ventilating the mines, (4) transportation, and (5) the amount of material that must be removed to get a given product. Thus in 1919 the production of copper per worker in the copper industry was 6½ tons in Michigan, nearly 16 in Idaho, and nearly 19 in Arizona. In Texas, where the oil wells average 27 barrels per day, there is only one worker for each 7100 barrels produced per year, while in Pennsylvania where the wells are old and average only 0.3 barrel per day the annual production per man is 820 barrels. Another noteworthy difference between mining and agriculture is the extreme localization of each product. Iowa, for example, is a great corn state, but corn furnished only 39 per cent of the value of its farm products in 1919, while animals furnished about 25, wheat 11, and hay 11. In Mississippi, one of the states where the one-crop system is most persistent, 54 per cent of the value of the farm products in 1919 was due to cotton, 18 to corn, and 14 to animals. On the other hand, in Pennsylvania, coal mining employs over 93 per cent of the persons engaged in mining; in Arizona an equal percentage is engaged in mining copper, and in four-fifths of the states over half the mining population is engaged in a single industry. In more than half the states the three leading mineral industries employ more than 90 per cent of all the people engaged in such occupations. This means that in mining regions, as in those devoted to one-crop agriculture, if the main industry suffers there is little else to fall back on.

The Problem of the Mineral Industries.—Every industry has its own problems, which often have a widespread effect. For example, how far can the production of gold be increased without lessening the value of the product? Anything which lowers the cost of producing gold, immediately increases the supply of gold brought to the mints, and raises the gold reserves. This tends to make money cheap, which is the same as making prices high. Thus any marked change in the rate at which gold is produced not only makes trouble in business, but raises a serious problem for the owner of gold mines.

The production of most mineral products varies according to the general conditions of business. The demand for iron, as we have seen, is regarded as a good indication of the general trend of business. Among the metals the price of copper is especially subject to fluctuations. Hence, copper mines often suffer periods of stagnation and the stock of copper companies is a favorite among stock market manipulators. Of late petroleum has been the most variable of all the main mineral products, both in the amount of production in any given area and in the price of the stock of its companies. Variations in mineral production have a great effect not only on the local population, but upon financial centers through fluctuations in dividends, in the price of stock and in the calls for new investments. The price of mineral products often determines how active many kinds of factories shall be.

Many fluctuations in mineral production arise from causes outside the general conditions of business. For example, the seasonal character of the coal business works much harm in this greatest of all mineral industries. Although industrial consumers create a demand for coal all the year, they burn more in the winter than the summer, not only because of the low temperature but because the busy season is more apt to come in winter. In the United States, domestic users, who consume about 120,000,000 tons per year against 180,000,000 by manufacturers, 125,000,000 by railroads, and 10,000,000 by steamships, provide an extremely seasonal market. Hence, the miners often work only part time. They have struck more than once in order to assure themselves at least thirty hours of work per week and wages enough in that time to enable them to support their families. They would work full time at lower hourly wages, if they were sure of full time work all the year. One remedy for this lies in storing coal during the dull season. With proper machinery the cost of putting it into storage and taking it out again is only ten to fifteen cents a ton. Such storage would reduce the cost of mining, free labor for other industries, and help the railroads. At present the railroads require an unnecessarily large equipment because there is a great demand for coal cars in the autumn while many are idle in the spring. The coal trains require engines and crews just when the crops also make great demands. In coal mining, more than in most businesses, one of the greatest needs is to overcome the effect of the seasons and create a uniform flow of business. The great difficulties of West Virginia in education, in public safety, and in other respects would be distinctly helped if the coal miners had steady work at fair wages all the year.

Another very serious type of fluctuation in the coal business arises from the fact that in no other industry are strikes so frequent, so widespread, and so prolonged. Here is the record of strikes in the bituminous coal mines of the United States for thirteen years:

Year.	Number of Strikers.	Working Days Lost.	Average Days Lost per Man.
1907	32,540	462,392	14
1908	145,145	5,449,938	38
1909	24,763	723,634	29
1910	218,493	19,250,524	88
1911	41,413	983,737	24
1912	311,056	12,527,305	40
1913	135,395	3,049,412	22½
1914	161,720	11,013,667	68
1915	67,190	2,467,431	37
1916	170,633	3,344,566	19½
1917	160,240	2,348,399	15
1918	79,395	508,526	6
1919	446,436	15,603,567	35
Yearly Average	153,168	5,979,470	38.9

The record indicates an average loss of about $125 per miner in wages each year, or one-sixth of the average income. The great coal strike of 1922 is estimated to have cost the miners about $50,000,000 per month in wages, the operators about $30,000,000 per month, and the general public another huge sum.

In no other state is the percentage of miners so high as in West Virginia, and nowhere else are serious strikes so common. During the present century there has been almost a state of civil war several times when the mine owners, through their private police organizations, have struggled with the miners.

The fluctuations due to the exhaustion of supplies are in the long run far more dangerous than any other fluctuations in mineral production. Fortunately this does not yet apply to coal, iron, aluminum, stone, clay, and lime. It applies, however, to most of the other metals and rarer mineral products. Abandoned copper, lead, and zinc mines can be counted by the score in various parts of the world; old gold dredging operations in California have left certain river valleys a mere waste of gravel. The world would probably soon use hundreds of times the present supply of platinum, tungsten and other rare minerals, if the supply were abundant. The scarcity of many minerals was especially emphasized during the Great War. For example, the United States is the largest user of chromite, but is not normally a large producer. In 1913 the domestic production was only 230 tons, or less than half of 1 per cent of the normal consumption of 65,000 tons, used mainly for special kinds of steel, for tanning leather and for refractory brick and furnace lining. By developing small deposits, the United States raised its production to nearly 84,000 tons in 1918, an amount almost equal to the imports of that year. But a few years of use on such a scale would much deplete the better deposits. Chromite is simply one of many minerals which have a great and growing value, but which appear to exist only in such small quantities that a century or two of exploitation like that which is now going on would practically exhaust them. No one who has any regard for the future can fail to feel the imperative need of careful conservation. It is not surprising that after the Great War no problems were harder to solve than those centering around rights to mineral wealth. A possible step toward the solution of some of these problems is thought by many people to lie in the growing movement toward vesting all mineral rights in the general public, while allowing and encouraging private enterprises to develop the minerals.

The Great Use of Wood in the United States and Canada.—City people with their brick houses, iron fences, and coal for fuel rarely appreciate the importance of wood. Nevertheless half the buildings in the United States and more than half in Canada are made of wood. It is estimated that nearly half the inhabitants employ wood extensively for fuel. Farmers are the greatest users of wood, for their buildings, implements, barrels, boxes, fences, and cordwood probably account for fully half the supply. Today the United States is the world's greatest producer of wood, while Canada produces vast supplies in proportion to her population. Russia has a larger acreage of forests than the two American countries, but it has not developed its supplies on a large scale. The estimated forest reserves of Canada, nearly one million million board feet and of the United States, over two million million, are probably not over thirty times as much as the United States uses each year. In fact, the United States each year uses more than four times the annual growth of its forests. Almost no other country uses wood so freely, the average per capita consumption being normally over 300 board feet in the United States, 150 in Germany, and 120 in Great Britain. Three-fifths of the United States forests are already gone and most of the timber which could easily be transported to large centers of population is exhausted. Half of the timber still standing is in three states, Washington, Oregon, and California, while British Columbia contains nearly half the Canadian supply, including by far the best grades.

The Changes in the Forest Industries.—Three great changes are taking place in the use of forest products in the United States. (1) The location of the main supply has moved southward and westward; (2) the relative importance of different kinds of wood has changed; (3) the methods of cutting and of conservation have altered. Until about 1850 the pine woods from Maine to northern New York and Pennsylvania were the chief sources of soft wood, white pine being the chief species and also much the best. Even in 1880 Maine still stood seventh and New York, fourth among the lumber-producing states, as appears in the following table. Then the northern parts of the Lake States, especially Michigan, Wisconsin, and Minnesota, became the center of supply, as appears from the order of the states in 1890. The production of white pine in the Lake States rose from 3½ million board feet in 1877, to 8½ in 1892, and then fell to 3 in 1906. Next the growing need of soft wood led to the exploitation of the great forests of the southern part of the Atlantic coastal plain, bringing Georgia and North Carolina among the first eight states in 1900 and advancing Louisiana to second place in 1910. But the south could not furnish enough, and in 1910 Washington had become the greatest lumber producer, while the great coniferous forests of the Pacific mountains also placed Oregon and California among the first eight states. With hardwood a change in location has likewise occurred. The oak and maple of the states from Pennsylvania to Michigan helped to give them a high place up to 1900, but now Tennessee and Arkansas have come into prominence. The hardwoods grow chiefly on the best soils and in the best climates. Hence, the area where they are still raised is greatly restricted by the growth of farming.

RANK OF STATES IN LUMBER PRODUCTION

Rank.	1880.	1890.	1900.	1910.	1915.	1918.
1.	Mich.	Mich.	Wis.	Wash.	Wash.	Wash.
2.	Penn.	Wis.	Mich.	La.	La.	La.
3.	Wis.	Penn.	Minn.	Miss.	Miss.	Ore.
4.	N. Y.	Minn.	Penn.	Ore.	N. C.	Miss.
5.	Ind.	Wash.	Ark.	Wis.	Ark.	Ark.
6.	Ohio	N. Y.	Wash.	Ark.	Tex.	Tex.
7.	Me.	Tex.	Ga.	Tex.	Ore.	Cal.
8.	Minn.	Ind.	N. C.	N. C.	Ala.	Ala.

The change in the location of the chief lumber areas has caused new kinds of wood to spring into prominence. The following table shows how the wood derived from northern and eastern species fell off from 1899 to 1918, while that derived from southern and especially northwestern species increased.

PRODUCTION OF LUMBER IN UNITED STATES IN MILLIONS OF BOARD FEET

	White Pine.	Yellow Pine.	Douglas Fir.	Oak.	Poplar.	Elm.
1899	7.74	9.66	1.74	4.44	1.12	0.46
1909	3.90	16.28	4.86	4.41	0.86	0.35
1918	2.20	10.85	5.82	2.03	0.29	0.20
Change in production, 1899–1918	−72%	+12%	+234%	−54%	−74%	−57%

The change in forest methods is well illustrated by the fact that the national forests in the United States increased from 46 million acres in 1899 to 167 million in 1909, while those of Canada rose from 700,000 in 1901 to 153 million in 1917. The need of a careful forest policy appears from the following annual averages for 1909 to 1918:

	Millions of Cubic Feet.	Per Cent.
Total wood cut in U. S. forests except for fuel..	14,319	100
Wasted in the forest and at the mill...........	10,037	70
Available for use..........................	4,282	30

Approximately 5 per cent of the remainder is lost in seasoning and still more in converting the raw lumber into finished products. Scarcely a quarter of the actual wood is finally used.

Enormous waste also occurs through forest fires due largely to the dry waste wood left when the lumbermen lop off the tops and branches of the trees. In the five years from 1916 to 1920 about 160,000 forest fires burned over 56,000,000 acres of land in the United States and caused a loss of $86,000,000 in timber alone, and probably a far greater loss in the destruction of the nitrogenous humus of the soil. The conservation policy of the United States and Canada is rapidly diminishing such losses. In addition to thus conserving the lumber supply and helping to steady the price, the forest reserve system prevents the washing away of the soil which is often a serious consequence when forest fires destroy the roots and small plants which hold the soil in place after the trees are cut. Another and growingly important benefit of forest reserves is that they provide wonderful opportunities for recreation. In 1917 over a quarter of a million non-residents are estimated to have visited the Maine woods, and to have spent there at least $30,000,000. If those woods were permanent forest reserves their value and permanence in this respect would be greatly increased.

The Relative Importance of Fisheries at Present.—Because fishing is one of the primary occupations like agriculture, mining, and lumbering its importance is often over-rated. For every person classified by the United States Census in 1920 as a fisherman the following numbers were engaged in other occupations.

Fishing........................	1	Domestic service.............	64
Lumbering and forest products..	5	Trade.......................	80
Mineral extraction............	21	Agriculture..................	202
Professions...................	41	Manufacturing and mechanical industries	241
Transportation................	58		
Clerical occupations...........	59		

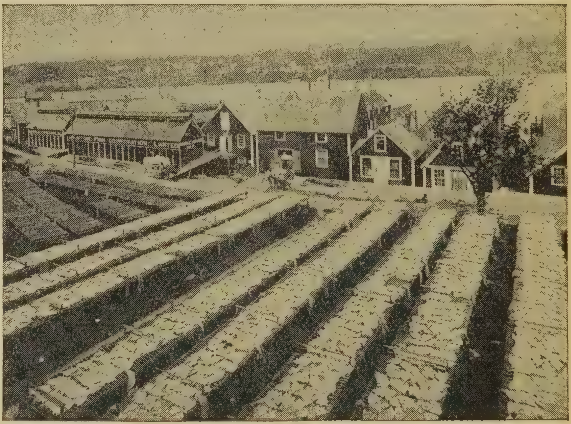
The relative importance of fishing, which includes oystering, also appears in the fact that the fishermen are approximately as numerous as any one of the following groups, actors, dentists, draftsmen, peddlers, candy makers, cabinet makers, stock herders, or fruit growers. Errand

and messenger boys are more than twice as numerous and nurses three times as abundant. The value of the fisheries in 1920 is liberally estimated as approximately $130,000,000, including Alaska, which supplied one-third. This is more than the catch of England, which stands next among the countries of the world and twice that of Japan which is third. Yet it is only about equal to the value of the sweet potatoes, kaffir corn, or cotton seed of the United States, and one-seventeenth that of the corn. During 1920 the value of the fisheries products was exceeded by that of corn, hay, wheat, cotton, oats, tobacco, apples, and barley, in the order named.

The Reasons for the Small Production of Fish.—Some of the chief hindrances to a greater use of fish are as follows: (1) The distance of the fishing grounds from home. Even the oysterman usually does his work at least a mile from home, whereas few American farmers have fields so far away. (2) The danger involved in seafaring. A noteworthy feature of the mortality statistics in the fishing countries of Iceland, Newfoundland, and Norway is the great excess of deaths of young men from 15 to 30 years of age compared with young women of the same ages. (3) The precariousness of the occupation. It is no light thing when a fishing boat sails several hundred miles to the Banks, and then searches for weeks without catching any appreciable supply of fish. The good years bring " prosperity and plenty," while the bad years bring " hardship and hunger." (4) The difficulty of preserving the product. Not only do fish spoil rapidly, but the fisherman cannot drive his animals alive to the railroad station and ship them to a well-prepared slaughter house as can the farmer. Nor can he suit his own convenience as to how many he will kill at a time. He must catch the fish when he finds them, and clean them, salt them, or otherwise preserve them at once. (5) This is one reason for another difficulty, namely the hardship of the fisherman's life. Such a life has indeed an attraction for many young men, and helps to produce the finest type of sailor, but the hardship causes many to shrink from it more than from most occupations.

These reasons, and others, join with the location of the fishes food supply in causing a large share of the fishery products of the United States to consist of oysters, lobster, salmon, and other species caught in shallow water close to the shore. Even " deep sea " fisheries are conducted in the relatively shallow water over " banks " such as those of George's. Newfoundland, and the North Sea. Only in such places does the sunlight reach the sea bottom so that vegetation can grow and supply food for the fish or for their prey. This food supply increases in high latitudes presumably because dead organisms decay quickly in the warm surface waters of low latitudes, but are preserved a long time in colder water, so that in high latitudes the sea contains more floating food than in low. The difficulty of preserving fish in warm countries and the unwillingness of tropical people to exert themselves as do the New Foundlanders, for example, also help to cause fishing to be less common in low latitudes than in high latitudes such as Alaska and the Labrador coast.

The Possibilities of a Food Supply from the Ocean.—Although the ocean today probably does not supply 1 per cent of the food of the United States, it offers one of the greatest sources of increased supply. Some of the ways in which the vast undeveloped resources of the sea can be developed are as follows: (1) By developing people's knowledge and taste so that new kinds of sea-food may be used. To a middle westerner it seems strange to find the following on one bill of fare in a small sea-grill in Boston, the greatest American market for fresh fish: cod, sole, flounder, halibut, schrod, mackerel, clams, bluefish, fresh salmon, crabs, butterfish, shrimps, lobster, oysters, swordfish, haddock, and finnan haddie. But the Bostonian has not yet learned to eat whale meat, shark, and the despised dogfish, although they are good food. (2) Modern methods of refrigeration make it far easier than formerly to use the fish of warm latitudes. Although fish are not so abundant there as farther north, they exist in vast quantities, and the warm climate and relative absence of storms lessen the danger and hardship of the fisherman. (3) Another means of increasing the use of the sea as a source of food lies in helping the fish through the first part of their lives. For every fish that reaches the size of one's finger hundreds or thousands of eggs and newly hatched fish are eaten by other animals. That is why in 1919, for example, the United States government not only distributed about 1,200 million fish eggs to local hatcheries to be



Keystone View Company.

FIG. 73.—Fish Drying at Digby, Nova Scotia.

One of the largest fish drying centers.

hatched under protected conditions, but distributed 4500 million fry and 150 million fingerlings, yearlings, and adults. Fish thus protected have a vastly greater chance of growing up than have those left to chance. Although fish hatcheries at present are of more value to inland waters than to the ocean, they represent a distinct tendency toward the control of the sea by man in somewhat the same way that he controls the land. Ages ago man lived on plants and animals that grew of themselves; now he lives on those that he himself raises. Where only one person could then get a precarious living in one square mile, two or three hundred can now provide for themselves abundantly. The leasing of oyster beds by the state, the licensing of lobster fisheries and the distribution of fish eggs are faint beginnings of the cultivation of the sea. Nowhere else, perhaps, is there a greater opportunity for man to increase his power over nature and obtain new supplies of food.

EXERCISES AND PROBLEMS

Note. See also Exercises on Chapter XIV

1. From Table 27 insert on a large map of the United States the name of the mineral industry standing first in each state and the number of thousand workers engaged in the industry. Shade the map in five colors according to the dominant industry: (1) coal, (2) petroleum, (3) iron, (4) other metals, (5) quarry products. Remember that in states like Maryland, Virginia, and Alabama the coal is all in the Appalachian portions. Find out what parts of Texas, Oklahoma, and California produce petroleum and shade accordingly. Shade the rest of these states in accordance with the second mineral, as given in Table 27. Where the production is so small that no data appear in Table 27, shade for quarry products such as gravel and sand. Discuss the distribution of the five types of products.

2. Make a similar map for the mineral industries second in importance. Which type shows the greatest increase in area in this map compared with the first? Why? How does the number of people employed in the second industry compare in general with the number in the first? What state receives the same shading in both maps and why? How do the petroleum and coal areas in the two maps compare?

3. Make a map of the third most important mineral product. In how many states does the third industry employ enough men to be really important? In what states do all three of the main mineral industries belong to one type? On another map shade each of these states with a special color. What do you conclude as to (*a*) the number of important mineral industries in any one state? (*b*) the relative location and extent of each of the three types—fuels, metals, and quarry products? (*c*) the centers of production?

4. On another set of maps of the United States insert in each state the number of persons engaged in each of the following mineral industries: (1) iron, (2) gold, silver, copper and quicksilver, (3) lead and zinc, (4) coal, (5) petroleum, (6) quarry products. Wherever two of the divisions given above are grouped together count half in each division. On each map shade the area where production is indicated. Point out which states are most important because of (*a*) the number of persons employed, (*b*) the amount of production as indicated in Table 26, and (*c*) the production in proportion to the population.

5. Discuss your own state in the light of Tables 26 and 27 and of the maps of the preceding problems.

6. Draw a map locating each of the forest regions of the following table which represents one of several ways of classifying American forests.

FOREST REGIONS OF THE UNITED STATES

Location.	Important Kinds of Wood.	Millions of Acres of Forest.		Stand of Timber	
		Original.	Remaining.	Original Stand in Billions of Board Feet.	Present Stand in Per Cent of Original
I. *Northern Region.* *Forest of the Past.* (Chiefly coniferous.)					
N. Eng. to Minn. with Appalachian prong to N. Ga.	White pine, hemlock, etc.	150	90	1000	30
II. *Southern Region.* *Forest of the Present.* (Chiefly coniferous.)					
N. J. to Texas and s. Mo.	Yellow pine predominates; hardwood plentiful in parts	220	150	1000	50
III. *Central Region.* *Farmer's Forest.* (Chiefly hardwood, largely cleared.)					
From s. N. Eng. W. and SW. between Northern and Southern regions	Oak, maple, walnut, etc.	250	130	1400	21
IV. *Rocky Mountain Region.* *Forest of Distant Future.* (Chiefly coniferous.)					
Scattered areas mostly on high slopes	W. yellow pine, firs, spruce, and W. hemlock	110	100	400	75
V. *Pacific Region.* *Forest of Immediate Future.* (Chiefly coniferous.)					
Among mountains	Douglas fir, white pine, redwood	90	80	1400	80
VI. *Alaska.* *Paper Forest.*					
Southern coast and along streams	Mostly spruce and hemlock	Not enough cut even for local use. Trees mostly rather poor but great source of pulp wood			

7. Write a comparison of two forest regions on the basis of all the data given in the text, in the preceding table, and in the following table.

CHANGES IN PERCENTAGE OF SUPPLY OF TIMBER CUT IN UNITED STATES SINCE 1850

Year.	Northeastern States.	Lake States.	Southern States.	Pacific States.
1850	54.5	6.4	13.8	3.9
1860	36.2	13.6	16.5	6.2
1870	36.8	24.4	9.4	3.6
1880	24.8	33.4	11.9	3.5
1890	18.4	36.3	15.9	7.3
1900	16.0	27.4	25.2	9.6
1914	9.0	10.5	47.7	19.3

8. Discuss the lumber and firewood problem of your own locality, showing its relation to (*a*) forest regions, (*b*) changes in production and type of wood, (*c*) source of supply, (*d*) transportation, (*e*) prices. Consult local carpenters, contractors, and lumber dealers. Look up your state in the lumber table in the World Almanac.

9. From the table of National Forests in the World Almanac insert the number of forests in each state and their area in thousands of acres. Discuss the distribution of National Forests and explain how it is related to (*a*) the great forest regions, (*b*) rainfall, (*c*) relief, (*d*) date of settlement, (*e*) density of population, (*f*) recreation, (*g*) pasturage. Find out as much as possible about the National Forest nearest your home.

10. In Colby's Source-Book of the Geography of North America look up the mining, lumbering, and fishing industries of Canada. Compare them with the corresponding activities in your own state and in the United States. Adopt the problems of this chapter to Canada so far as possible and work them out, using Canada instead of the United States.

CHAPTER XXV

THE AGRICULTURAL INDUSTRY OF THE UNITED STATES

The Variety of Agricultural Types.—The variety of the farming industry of the United States and Canada is extraordinary. In some places the one-crop type prevails as among the potato farmers of Aroostook County in Maine. Elsewhere horticulture of a highly intensive type is found, as in the market gardens near the great cities, and at intervals along the Atlantic coast from Norfolk to Florida. Another type of horticulture prevails in the irrigated orchards and gardens of the West, especially on the farms of California where vegetables like asparagus and green peas reach a maximum development. In a small way the millions of people who have home gardens are also horticulturists. Of quite a different type are the animal farms. Some supply milk for the cities while elsewhere the milk is made into cheese and butter, as in Wisconsin. The sheep and cattle ranches of the West represent still other types of animal farms. In addition to all these there are what we have called the all-around farmers. They are most numerous in the fertile prairie states and Ontario, but are found wherever the intelligent and careful farmer takes pains to raise a diversity of products.

The Causes of Different Agricultural Types.—The great diversity of farming in the United States and Canada is due to many causes, including (1) the racial qualities, training, and energy of the farmers, (2) the soil, (3) the relief of the lands, (4) the climate, and its relation to the optima of plants and animals, (5) the distribution of insect pests, rusts, blights, and similar scourges, (6) transportation, and (7) the location and character of markets. When immigrants first come to America or move from one farming region to another, all but the most intelligent usually begin by trying to farm in the same way as at home. Thus the English when they first came to America thought that wheat and root crops were the most important products. The Germans introduced their own special methods of intensive farming which have persisted to an uncommon degree in southeastern Pennsylvania. When the Italians reach America they are apt to set out vineyards and to plant a great variety of trees and crops in a single field, a practice which is common where irrigation prevails. People from Scandinavia usually want to make dairy cattle a main part of their farming while the Mexican thinks that a cattle ranch is the only real farm. When people move from one part of the country to another the same thing often happens. For example, not a few farmers, in spite of the advice of previous settlers, have tried to raise grain without irrigation on the apparently fruitful plains of Arizona. They saw an abundance of wild grass and bushes and did not realize that such plants can thrive with far less rain than ordinary crops.

The Adaptation of Farming to Geographical Conditions.—An immigrant farmer who brings to America his old ideas of farming soon finds that he must adapt his methods to the new surroundings. One adaptation depends on the farmer's own health and energy. In a northern region such as Maine or Minnesota he is stimulated to work. In the South the fair Nordic from northern Europe may find that he cannot work vigorously in the sun. He tends more and more to rely on colored labor, but if he is not sufficiently competent to be an employer, he may sink to the grade of a poor white and suffer from competition with the colored man. Another great factor in determining the type of farming is the soil and relief. The abandonment of New England farms is partly a matter of relief, and to a less degree of soil. The climate of Massachusetts is only a little less favorable for agriculture than that of Illinois, but the levelness of Illinois, and the depth and richness of the soil, give that state an enormous advantage. The climate also makes a

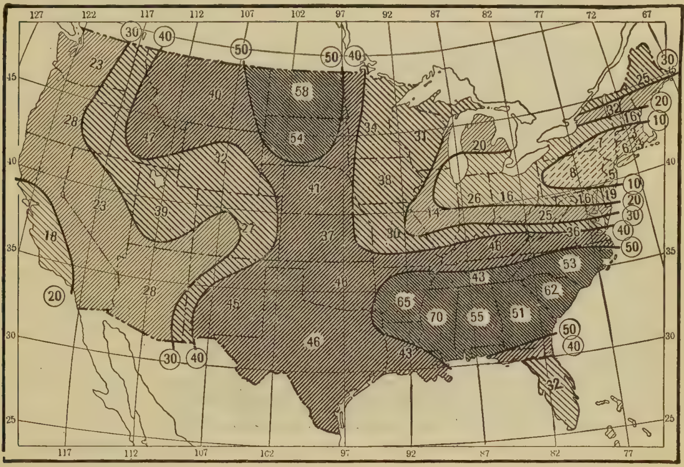
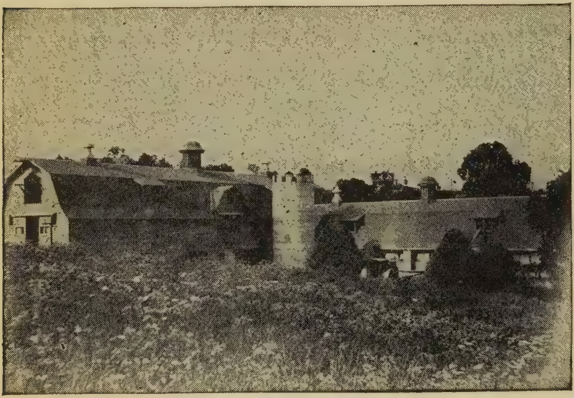


FIG. 74.—Percentage of Gainfully Employed Persons Engaged in Agriculture in the United States, 1920.

great difference in the methods of farming and the type of crop. It would be foolish for a Minnesota farmer to try to raise cotton, and it does not pay for the Georgia farmer to raise much wheat, simply because no crop will thrive when the climate departs too far from its optimum. Insects or other pests may greatly modify certain forms of agriculture. For example, the cotton raisers of Texas have been obliged to depend more than formerly upon other crops because the boll weevil has injured the cotton so much. The cotton farmers of Texas have few large truck gardens partly because transportation to the great markets in the North Atlantic states is more expensive than from Florida or Virginia.

Farming in Typical Parts of the United States and Canada.—(1) *The New England Type.*—A good way to understand the interplay of all the various factors is to consider the agriculture of certain typical regions. A relief map shows that New England, northern New York, and most of southeastern Canada form a fairly rugged but not highly mountainous region. A map of the length of the growing season (Fig. 8) shows that in this region the growing season is comparatively short, for the season diminishes in length not only from south to north, but from west to east. Other maps, such as those for wheat (Fig. 77), and corn, oats, barley and others as given in the *Geography of the World's Agriculture* or the *Statistical Atlas of the United States*, show that the production of crops in this region is relatively small. Throughout most of New England and the Maritime Provinces the farmers rely largely on root crops, especially potatoes, and upon hay and cattle.



Keystone View Company.

FIG. 75.—A Modern Dairy Barn.

Although there are great differences from place to place the general character of New England agriculture may be judged from a typical area such as Worcester County in Massachusetts. Some statistics for this are given in the table on page 344. If these are studied carefully and compared with similar statistics for other parts of the country and for the reader's own region, they shed much light on how farming varies from region to region in response to the geographical conditions. The table is divided into four parts: (I) the farm, (II) the farmer, (III) the products, (IV) the expenses. As to the farm, Col. B shows that the average size in Worcester County is 84 acres, which is small compared with western farms but fairly large compared with those of the South or near the cities. Because of the ruggedness of the land and the poor rocky quality of the thin soil, only about 35 per cent (Col. C) of the land is improved, which means that only 30 acres are actually cultivated while 54 are in woodland and unimproved pasture. The value of the average farm in Worcester County in 1919 was $7800 or $36 per acre including the unimproved land. If the improved land alone were taken, this value would rise much higher. Since Worcester County is near the large cities of Worcester and Boston its farms are smaller and the values greater than the average for New England.

The second part of the table shows that 70 per cent of those who cultivate the farms of Worcester County are native whites, chiefly the descendants of early immigrants from Great Britain. The number of colored farmers is negligible (Col. G), but about 30 per cent of the farmers are foreign born, which means that foreigners are taking up New England farms quite rapidly. New England is often spoken of as a region of abandoned farms. These figures suggest that the abandonment is only temporary, and that as the original farmers of British descent move away, their place is gradually being taken by newcomers, mostly from other parts of Europe. Practically all the farmers, both native born and foreign, own their farms, for only 6 per cent of the farms are operated by tenants. (Col. H.) This is a good sign, for the man who owns his farm is more likely to be a responsible and desirable citizen than one who rents.

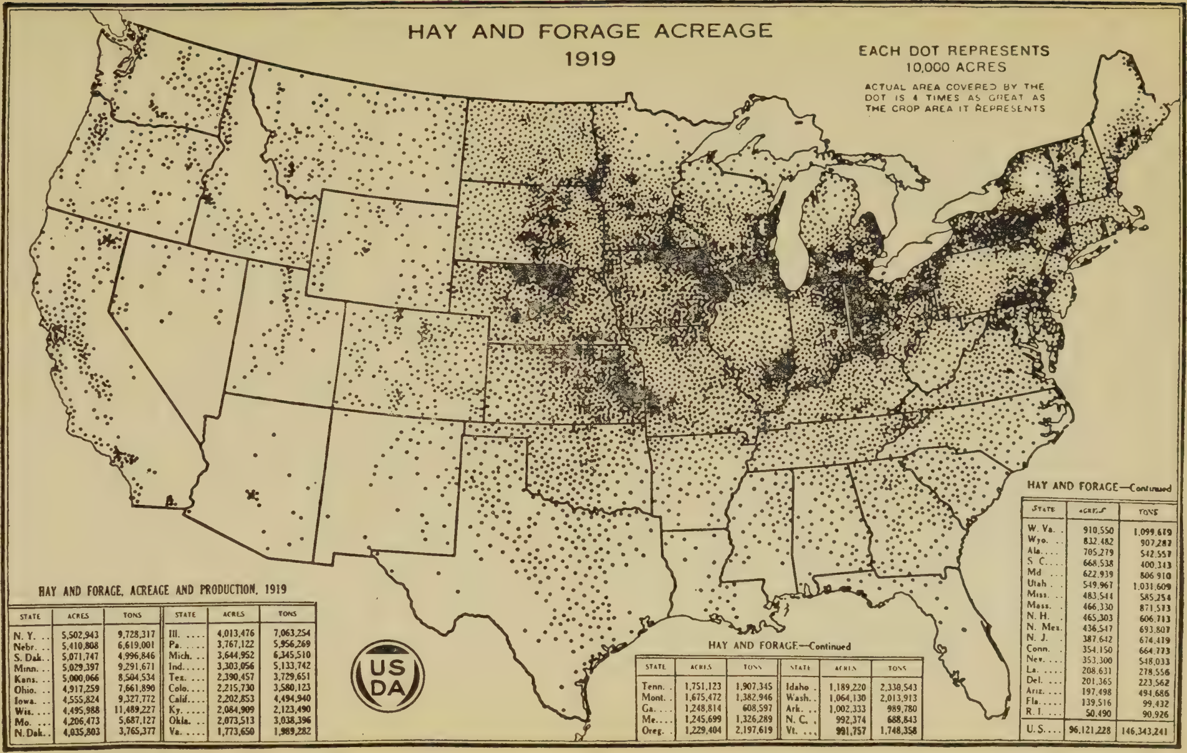
As to products, the average value of all crops per farm in Worcester County in 1919 was $1410 (Col. I) This is small compared with the farms of almost any other type or almost any other part of the country. The value per acre, however (Col. J) is about medium. Cols. K to M show the kind of crops. The New England farms raise very little grain, largely because of the relief, but partly because of the relatively short growing season. On the other hand, more than half the crops consist of hay and forage which is fed to cattle, while a third consists of fruit and vegetables, especially potatoes. In Col. N it appears that the animals on the farm are almost as valuable as the crops raised in a single year. How much new value is produced by the animals each year in the form of the young that are raised or of old animals that are killed for meat or other purposes cannot be stated definitely but we may roughly call it one-fourth of the total value. Since dairy and poultry

THE FARMS OF TEN TYPICAL SECTIONS OF THE UNITED STATES, 1919

	A.	B.	C.	D.	E.	F.	G.	H.
		I. The Farm.				II. The Farmer.		
Type of Region.	County Chosen as Example.	Average Size in Acres.	Per Cent of Improved Land per Farm.	Value of All Property per Farm.	Average Value of Land per Acre.	Per Cent of Native White Farmers.	Per Cent of Colored Farmers.	Per Cent of Farms Operated by Tenants.
New England...	Worcester, Mass....	84	35	$7,800	$36	70	0	6
Truck Area	Camden, N. J	49	78	8,600	92	64	2	23
Cotton Belt .	Washington, Miss.	34	73	6,200	146	6	93	95
Eastern Plateau.	Clay, Ky..........	44	36	1,900	15	98	2	39
Corn Belt......	McLean, Ill	166	96	62,000	322	91	0	58
Wheat Belt	Cass, N. D........	421	94	41,000	76	61	0	40
Dry Plains.....	Kit Carson, Colo...	500	32	16,800	26	88	0	23
Cattle Country..	Grant, N. M	870	7	16,000	8	83	0	23
Irrigation Type.	Utah, Utah	98	43	9,900	72	85	0	10
Fruit District...	Fresno, Calif	148	51	34,000	197	50	7	15

	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.
	III. The Products.							IV. The Expenses.		
								Average Expenditure per Farm for		
Type of Region.	Value of All Crops per Farm.	Value of All Crops per Acre of Improved Land.	Value of Grain per Farm.	Value of Hay and Forage. per Farm.	Value of Fruit and Vegetables per Farm.	Total Value of All Animals per Farm.	Value of Dairy and Poultry Products per Farm.	Labor.	Fertilizer.	Feed.
N. England	$1410	$48	$ 84	$762	$558	$1340	$1225	$430	$48	$667
Truck ...	3260	85	325	253	2780	760	346	588	409	332
Cotton	1375	55	115	55	18	520	52	56	1	54
E. Plateau	645	41	386	73	137	364	126	18	3	26
Corn.......	6240	39	5680	420	125	2560	1050	665	11	265
Wheat.....	6650	17	4800	1200	610	2600	45	1250	4	171
Dry Plateau	2250	14	1650	54	59	2125	36	216	0	180
Cattle......	1080	18	620	300	140	7700	236	306	0	243
Irrigation...	2340	56	423	700	610*	1272	274	244	4	117
Fruit......	5800	77	260	755	4750	1370	350	1190	29	300

* Not including sugar beets.


HAY AND FORAGE ACREAGE
1919
EACH DOT REPRESENTS
10,000 ACRES
ACTUAL AREA COVERED BY THE DOT IS 4 TIMES AS GREAT AS THE CROP AREA IT REPRESENTS
US DA

HAY AND FORAGE, ACREAGE AND PRODUCTION, 1919

STATE	ACRES	TONS	STATE	ACRES	TONS
N. Y. ..	5,502,943	9,728,317	Ill.	4,013,476	7,063,254
Nebr. ..	5,410,808	6,619,001	Pa.	3,767,122	5,956,269
S. Dak. .	5,071,747	4,996,846	Mich. ..	3,644,952	6,345,510
Minn. ..	5,029,397	9,291,671	Ind.	3,303,056	5,133,742
Kans. ..	5,000,066	8,504,534	Tex. ...	2,390,457	3,729,651
Ohio. ..	4,917,259	7,661,890	Colo. ...	2,215,730	3,580,123
Iowa. ..	4,555,824	9,327,772	Calif. ...	2,202,853	4,494,940
Wis. ...	4,495,988	11,489,227	Ky.	2,084,909	2,123,490
Mo. ...	4,206,473	5,687,127	Okla. ..	2,073,513	3,038,396
N. Dak. .	4,035,803	3,765,377	Va.	1,773,650	1,989,282

HAY AND FORAGE—Continued

STATE	ACRES	TONS	STATE	ACRES	TONS
Tenn. .	1,751,123	1,907,345	Idaho .	1,189,220	2,330,543
Mont. .	1,675,472	1,382,946	Wash. .	1,064,130	2,013,913
Ga. ...	1,248,814	608,597	Ark. ..	1,002,333	989,780
Me. ...	1,245,699	1,326,289	N. C. .	992,374	688,843
Oreg. .	1,229,404	2,197,619	Vt. ...	991,757	1,748,358

HAY AND FORAGE—Continued

STATE	ACRES	TONS
W. Va. .	910,550	1,099,619
Wyo. ..	832,482	907,287
Ala. ...	705,279	542,557
S. C. ...	668,538	400,343
Md ...	622,939	806,910
Utah . .	549,967	1,031,609
Miss. ..	483,544	585,254
Mass. .	466,330	871,573
N. H. .	465,303	606,713
N. Mex.	436,547	693,807
N. J. .	387,642	674,419
Conn. .	354,150	664,773
Nev. ...	353,300	548,033
La.	208,631	278,556
Del. ...	201,365	223,562
Ariz. ...	197,498	494,686
Fla.	139,516	99,432
R. I. ...	50,490	90,926
U. S. ...	96,121,228	146,343,241

Courtesy of U. S. Department of Agriculture.

FIG. 76.—Production of Hay in the United States, 1919.

products yield almost as much as all crops combined, it is evident that animals in one form or other are the main source of income.

The approximate income of these New England farmers may be estimated thus: in Col. I, $1410, a fourth of Col. N, $335, Col. O, $1225, and perhaps $400 to represent the rental value of the farmer's house, provided he owns it without a mortgage, and the food which he and his family consume without keeping a record of it,—a total of $3370. From this we deduct $430 for labor, $48 for fertilizer, $667 for feed for animals, and perhaps $700 for hay and forage included in Col. I, but consumed on the farm. Thus in 1919, a year of very high prices, the average income, even in a relatively prosperous region like Worcester County, was only about $1500.

This picture of the New England farm and its products needs to be supplemented by studies of special sections such as the rich tobacco farms of the Connecticut Valley, the potato farms of Aroostook County, and the truck farms and market gardens that will be considered later. Nevertheless, in a general way it represents the average New England farmer, and shows that he spends most of his time in raising hay and forage and in taking care of his cattle and dairy products.

(2) *The Truck Areas.*—Truck farms and market gardens are especially good examples of the effect of a large market. They cannot thrive unless within quick and easy reach of large cities where people do not raise their own vegetables. Camden County, New Jersey, is a good example because of its nearness to Philadelphia. The table shows that the average Camden truck farm is little more than half as large as the New England farm in Worcester County. But a much larger proportion, 78 per cent, is improved so that the actual cultivated land is 38 acres in place of 30 for the Worcester County farms. The value of the farm is a little higher than in Massachusetts, while the nearness to the great city makes the value per acre nearly three times as great. Here, even more than in New England, foreign-born farmers are taking up the land, for only 64 per cent are native whites, 2 per cent negroes, and the remaining 34 per cent foreign-born. Many of the foreign-born and some of the whites rent their farms, for 23 per cent are operated by tenants. Col. I suggests that it is more profitable to run a truck farm near a great city than to run a dairy farm a little farther away. When the income is calculated, this suggestion is confirmed. Even though large deductions must be made for labor, fertilizer, and feed, the net income in 1919 was over $2500, about two-thirds more than that of the New England dairy farmer. The truck farmer pays little attention to grain and hay, for the two together yielded him only about $600 in 1919, while fruit and especially vegetables brought nearly $2800. He is also a great user of

fertilizers. The map of the amount spent for fertilizers, Fig. 80, shows how largely these are required in the truck areas near the cities and in certain special places like the tobacco farms in the Connecticut Valley and the Carolinas, where the crops make great demands on the soil and there are relatively few animals to supply manure.

(3) *The Cotton Belt.*—The cotton belt includes the southeastern states shown in Table 16 as raising appreciable quantities of cotton, but in Texas only the eastern part of the state should be included. The farms in a typical county in Mississippi average only 34 acres in size, but have a fairly high value per acre. The percentage of native white farmers is extremely small, the great majority of the farmers being negroes, practically all of whom as well as some of the white farmers are tenants. The total annual value of all crops is about the same as in Massachusetts, but only a trifle is added by animal products. The average annual income from all sources aside from cotton amounts to only about $350, so that about three-fourths of the entire income is derived from cotton. Evidently one-crop farming is here carried to great extremes. This fact and the prevalence of tenancy indicate that the social and economic conditions are serious. The ravages of the boll weevil and other cotton pests deplete the cotton farmer's income considerably.

(4) *The Eastern Plateau.*—North and northwest of the cotton belt, the Eastern or Allegheny Plateau shelters a relatively small and peculiar group of farmers. They are interesting because of their unique character, but are of little importance to business in general. Here among the Appalachians in Kentucky, Tennessee, and the neighboring states the percentage of native white farmers is larger than in any other part of the United States. The value of their small farms is so extremely low that it would take 33 farms in Clay County, Kentucky, to be as valuable as one farm in McLean County, Illinois. This fact brings out with great force the effect of relief. Clay County has a climate differing only a little from that of central Illinois. There is no reason to think that its white farmers inherit any less ability than those of the neighboring states. Nor does it lie at an excessive distance from great markets such as Cincinnati. The main trouble is that the land is rough. Hence much of it cannot be cultivated, and even if the farmers raise surplus crops, the expense of transportation prohibits taking them to market unless reduced to some form like moonshine whiskey where the value is high and the bulk small. Being poor, scattered, and isolated the farmers of the Plateau cannot afford to make roads, have good schools, and support good physicians, ministers, and other agencies that help a region to advance. To their other disabilities is added an unusually large amount of hookworm and other diseases that keep many

of them weak and anemic. All these causes combine to make the plateau farmers almost the most backward in the United States.

(5) *The Corn Belt.*—Only 200 miles north of Clay County one is in the midst of the corn belt, the richest agricultural section of the United States and perhaps of the world. The corn belt includes the prairie plains from Ohio westward through Illinois, Indiana, Iowa, and Nebraska (Fig. 1). The general levelness not only helps to make the soil deep and fertile, but facilitates transportation, favors the use of machinery, and causes the erosion of the fields to be small. The corn belt also has the advantage of an unusually good climate both for men and crops. The importance of agriculture in this belt is shown by the fact that four states have over 90 per cent of their total area in farms while Iowa has over 94 per cent.

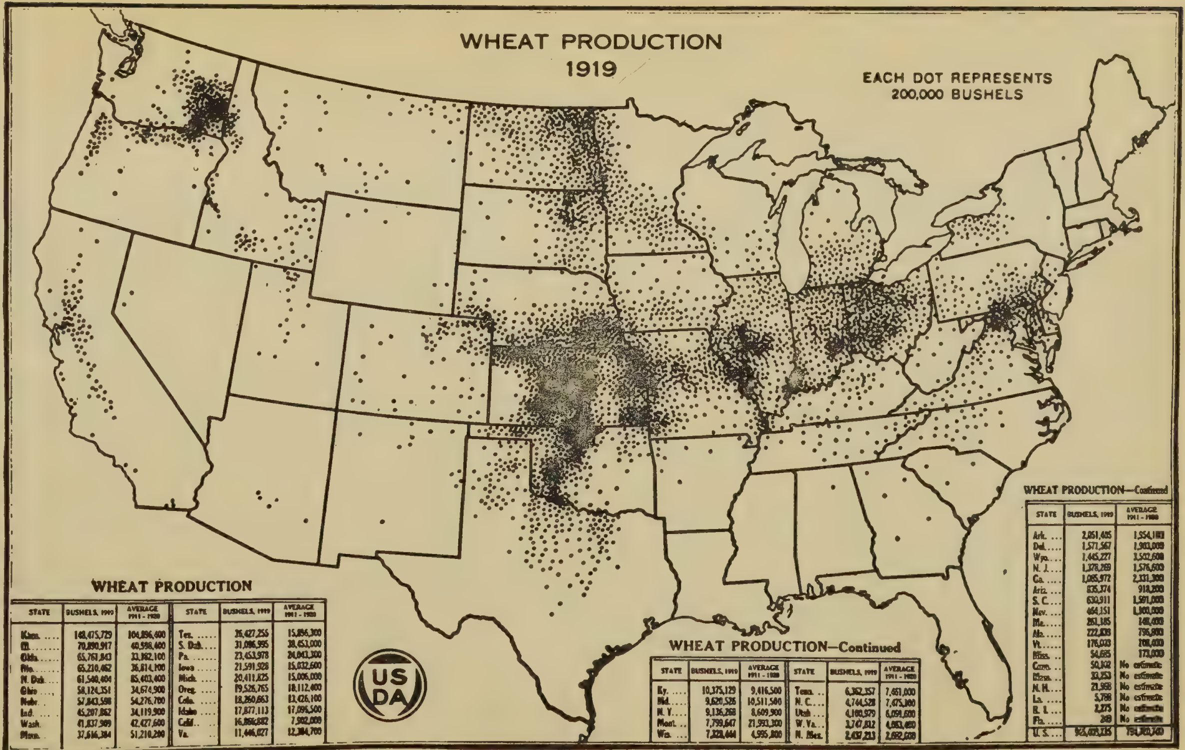
Contrast McLean County in north central Illinois with Clay County in the Plateau only 300 miles away. The size of the average farm in McLean County is 166 acres, which means that most farms still consist of a quarter section, or a quarter of a square mile which was the size of the farms given by the government to the original settlers. Of these 166 acres 96 per cent are improved, which is an extremely large percentage. The average farm in 1919 was worth $62,000 or $322 per acre, so that the farmer who is almost always a native born white, is a comparatively rich man.

Column H indicates the beginning of an unfortunate state of affairs. In the corn belt, as in the South (Fig. 42), tenancy has become common, but for a different reason, namely, the great prosperity of the farmers. Their land has yielded so abundantly and is located so near some of the great consuming centers such as Chicago and St. Louis that the farmers have grown rich. Many have retired and settled in the towns. Their sons have gone to college or to the city, and do not care to continue working on the farm. So the farms are rented to tenants. Some of these are people from the East, others are foreign immigrants, and some are people who have lately become interested in farming, or who have been unfortunate and have had to sell their farms. In most cases the tenants do not cultivate so carefully as the owners, and do not feel so much responsibility for the general good of the community. Hence the growth of tenancy, although a sign of prosperity, is also a warning of danger.

In the section of the table labeled "Products" the value of all crops in McLean County is seen to have averaged $6200 per farm in the census year 1919. Although that was a year of high prices, the income from crops on Illinois farms always averages large. The value per acre, $39, is not particularly high, to be sure, for the farmer cannot cultivate so large an area very intensively, but even with extensive cultivation the total income is high. Since these corn-belt farmers each year raise animals which are worth perhaps a quarter or more of the value given in Col. N, and since their hay is worth $420 per farm, their fruit and vegetables $125, and their dairy products $1050, the average farmer in 1919 had an income of about $2200 per year aside from grain. Since 44 per cent of the land devoted to grain is sown with crops other than corn, it is evident that even if the corn crop should fail entirely the farmers would still have a good income. In other words, an analysis of a typical county in the corn belt indicates that although corn is the chief crop, it furnishes decidedly less than half the yearly income. The good corn-belt farmers practice all-around agriculture in an almost ideal climate with an almost ideal soil, and with unsurpassed facilities for transportation. They are correspondingly safe, prosperous, and contented.

(6) *The Wheat Belt.*—The wheat belt of the Great Plains of America comprises the states from North Dakota southward to Oklahoma and even northern Texas, that is, the area which lies outside the corn belt and is heavily shaded in Fig. 77. Cass County, North Dakota, the example in the table, shows a marked contrast to the corn belt. The farms are twice as large but the total value per farm is only two-thirds as great, and per acre only a quarter as great as in Illinois. The percentage of native white farmers is much less, there being a large number of people from northern Europe. The number of farms operated by tenants though still large is only two-thirds as great as in McLean County. Inasmuch as the land is level the percentage of improved land is about as great as in the corn belt. The total income from crops in the wheat belt is greater than from the corn belt farms, but inasmuch as there is very little from dairy and poultry products the total income is less. A careful study of this particular example shows that the crops are not so well balanced as in the corn belt. About 67 per cent of all the land devoted to grain, or an average of 182 acres for each farm, is in wheat, and this one crop provides about half the farmer's income. Animals provide perhaps a tenth, vegetables, chiefly potatoes, another tenth, and hay and forage two-tenths. The average production of wheat is only 7 or 8 bushels per acre compared with 17 or 18 for the same product in many of the corn-belt counties. This illustrates the extent to which agriculture in the wheat belt not only tends toward the one-crop type but is extensive rather than intensive.

An interesting feature of the wheat belt is seen in Fig. 78. The United States Department of Agriculture makes careful estimates of the yield per acre when all products are taken together and each is given a weight proportional to area devoted to it. Such estimates are made



WHEAT PRODUCTION

STATE	BUSHELS, 1919	AVERAGE 1911 - 1920	STATE	BUSHELS, 1919	AVERAGE 1911 - 1920
Kans.	148,475,729	104,896,400	Tex.	36,427,255	15,896,300
Ill.	70,890,917	40,598,400	S. Dak. ...	31,096,995	38,453,000
Okla.	65,761,843	33,182,100	Pa.	23,453,978	24,043,300
Mo.	65,210,462	36,814,100	Iowa	21,591,928	15,032,600
N. Dak. ...	61,540,404	85,403,400	Mich.	20,411,825	15,006,000
Ohio	58,124,351	34,674,900	Oreg.	19,526,765	18,112,400
Nebr. ..	57,843,598	54,276,700	Colo.	18,260,863	13,426,100
Ind.	45,207,862	34,119,900	Idaho	17,877,113	17,096,500
Wash.	41,837,989	42,427,600	Calif.	16,866,882	7,982,000
Minn. .	37,616,384	51,210,200	Va. ..	11,446,027	12,384,700

WHEAT PRODUCTION—Continued

STATE	BUSHELS, 1919	AVERAGE 1911 - 1920	STATE	BUSHELS, 1919	AVERAGE 1911 - 1920
Ky.	10,375,129	9,416,500	Tenn. ..	6,362,357	7,481,000
Md.	9,620,525	10,511,500	N. C. ...	4,744,528	7,675,100
N. Y.	9,136,268	8,609,900	Utah ...	4,180,979	6,091,600
Mont. ..	7,799,647	21,993,300	W. Va. ..	3,747,812	4,083,400
Wis. ...	7,323,444	4,995,800	N. Mex.	2,437,213	2,692,000

WHEAT PRODUCTION—Continued

STATE	BUSHELS, 1919	AVERAGE 1911 - 1920
Ark.	2,051,405	1,554,100
Del.	1,571,567	1,903,000
Wyo. ...	1,445,227	3,502,600
N. J. ...	1,378,289	1,576,800
Ga.	1,085,972	2,331,300
Ariz. ...	835,374	918,200
S. C. ...	630,911	1,591,000
Nev.	464,151	1,300,000
Me.	281,185	148,400
Ala.	222,838	796,800
Vt.	176,023	108,600
Miss. ..	54,685	173,000
Conn. ..	50,102	No estimate
Mass. ..	33,253	No estimate
N. H. ...	21,988	No estimate
La.	5,788	No estimate
R. I. ...	2,275	No estimate
Fla.	288	No estimate
U. S. ...	945,403,215	793,780,700

Courtesy of U. S. Department of Agriculture.

FIG. 77.—Production of Wheat in the United States, 1919.

for each state each year. Fig. 79 shows the number of times by which the best year from 1910 to 1919 exceeded the worst year. For example,

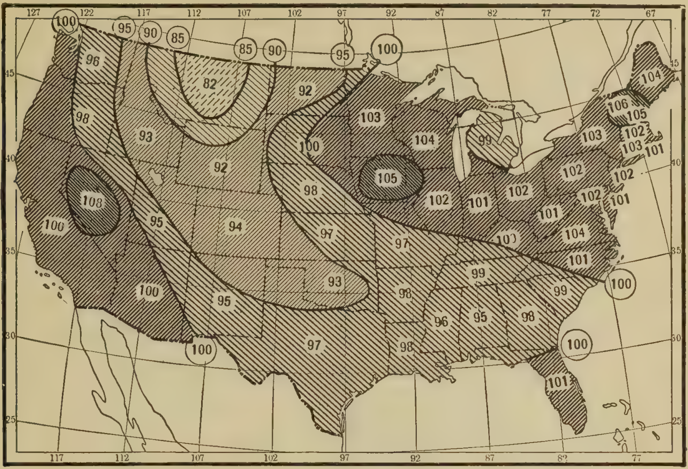


FIG. 78.—Relative Productivity of the Land in the United States, 1910–1919.

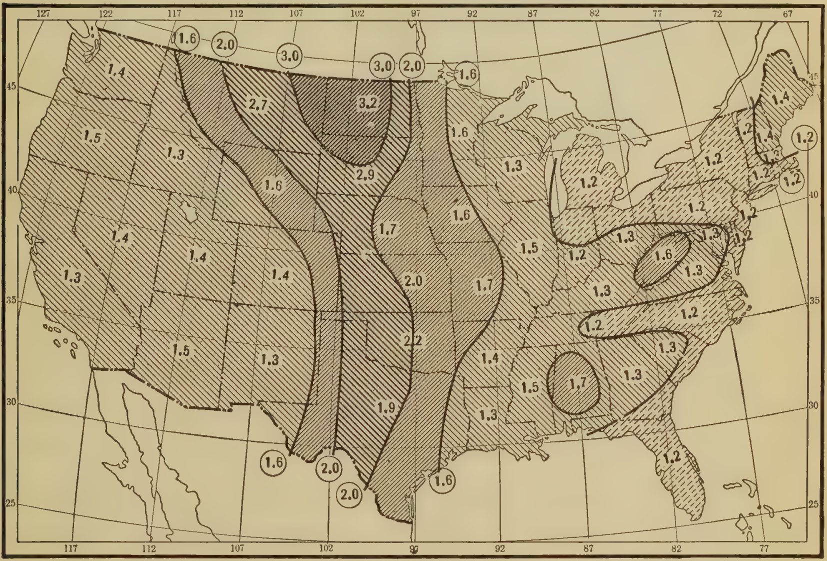


FIG. 79.—Relation between Average Yield of Crops per Acre in Best and Poorest Years from 1910 to 1919.

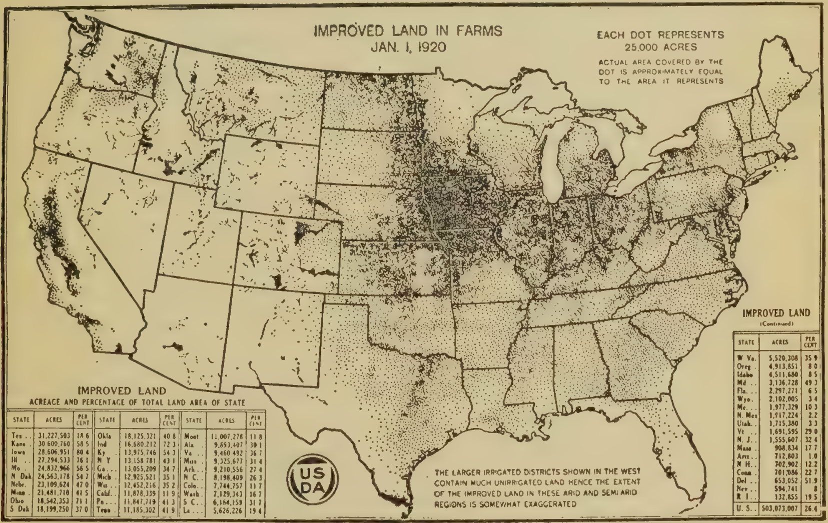
in Pennsylvania, as appears in Table 24, the average crop yield for the worst year of this period was 91, while for the best year it was 110, or 1.2 times as much. In Illinois, in the heart of the corn belt, the worst year had an average crop yield of 80 and the best of 118, or 1.5 as much. As soon as the wheat belt is reached there is a great increase in the contrast between the best and the worst years. In North Dakota, the worst year had a yield of 43, the best of 142, or 3.3 times as much. In the entire belt from North Dakota to Texas the variability of the crops from year to year is much greater than in any other part of the country. Farther east the rainfall is sufficient so that a moderate drought does much less damage than in the wheat belt. In the dry regions of the West irrigation insures a rather uniform yield of crops. The wheat belt, however, lies along the border line between the well watered east and the irrigated west. Even a slight diminution in its 20 or 30 inches of rainfall affects the crops seriously. Moreover in the north a cold winter may have a harmful effect. Thus while the farmers of the Dakotas and the rest of the wheat belt have large incomes in relatively good years, they are more likely to suffer serious reverses than almost any other set of farmers in the United States.

This variability of the crops in the wheat belt is apparently connected with the fact that great farmers' political movements tend to arise or at least to become strong in the tier of states from North Dakota to Texas. One of these was the Grange, which was founded in 1867 for educational purposes. In 1873–1874, when poor crops impoverished the farmers on what was then almost the western frontier, the Grange undertook all sorts of cooperative schemes and entered politics. Later, about 1889, a similar movement under the name of the Farmers' Alliance reached its greatest strength in the same regions. It developed into a so-called non-partisan movement generally known as the Populist Party. Again during the Great War a similar organization known as the Non-Partisan League grew up in North Dakota where the great fluctuations in the yield of the crops helped to stir up the farmers to try cooperative schemes of all kinds. This movement like its predecessors failed to accomplish its immediate purpose, but in 1921–1922 the Agricultural Bloc, a coalition of Congressmen representing the agricultural states, particularly those of the wheat belt, exercised great influence on legislation. Other factors played a part in all these movements, but it is significant that they attained their greatest strength where variations in the crops cause the farmers to shift most rapidly from prosperity to poverty and back again.

(7) *The Dry Plains.*—The dry plains lie at the eastern base of the Rocky Mountains between the wheat belt and the typical cattle country The large part played by grain and especially wheat shows that this region is like the wheat belt in many respects. The size of the farms

and the relatively large value of the animals compared with the annual value of the crops indicate greater aridity than in the wheat belt, and make the dry plains farms like those of the cattle region in many respects.

(8) *The Cattle Country.*—The cattle country comprises great areas in the dry parts of the West among and beyond the Rocky Mountains. The actual number of cattle is of course far larger in the states farther east, but in proportion to the population, as is shown in Table 22, Col. C, the number is greatest in the cattle country. The cattle ranches by their very nature must be of large extent. Those of Grant County in New Mexico average 25 times as large as the cotton farms in Washington County, Mississippi. Only a very small part of the land is improved and the value per acre drops to $8, or about a fortieth the value in the corn belt. A marked feature of this part of the country is the large percentage of native white farmers and the comparatively small number of tenants. The distribution of income is favorable. Although the average value of all crops was only $1080 in 1919, dairy and poultry products yielded $236, and cattle probably yielded in the vicinity of $2000. It should be noted, however, that because of the scanty rainfall a slight diminution in precipitation causes a good many cattle to perish, especially the calves, or more often, leads the farmer to


IMPROVED LAND IN FARMS
JAN. 1, 1920
EACH DOT REPRESENTS
25,000 ACRES
ACTUAL AREA COVERED BY THE DOT IS APPROXIMATELY EQUAL TO THE AREA IT REPRESENTS
USDA
THE LARGER IRRIGATED DISTRICTS SHOWN IN THE WEST CONTAIN MUCH UNIRRIGATED LAND HENCE THE EXTENT OF THE IMPROVED LAND IN THESE ARID AND SEMI ARID REGIONS IS SOMEWHAT EXAGGERATED

IMPROVED LAND

ACREAGE AND PERCENTAGE OF TOTAL LAND AREA OF STATE

STATE	ACRES	PER CENT	STATE	ACRES	PER CENT	STATE	ACRES	PER CENT
Tex . .	31,227,503	18.6	Okla	18,125,321	40.8	Mont	11,007,278	11.8
Kans .	30,600,760	58.5	Ind	16,680,212	72.3	Ala .	9,893,407	30.1
Iowa	28,606,951	80.4	Ky .	13,975,746	54.3	Va . .	9,460,492	36.7
Ill . .	27,294,533	76.1	N Y	13,158,781	43.1	Miss .	9,325,677	31.4
Mo .	24,832,966	56.5	Ga . . .	13,055,209	34.7	Ark . .	9,210,556	27.4
N Dak	24,563,178	54.7	Mich .	12,925,521	35.1	N C . .	8,198,409	26.3
Nebr.	23,109,624	47.0	Wis . .	12,452,216	35.2	Colo . .	7,744,757	11.7
Minn .	21,481,710	41.5	Calif . .	11,878,339	11.9	Wash .	7,129,343	16.7
Ohio	18,542,353	71.1	Pa . . .	11,847,719	41.3	S C . .	6,184,159	31.7
S Dak	18,199,250	37.0	Tenn .	11,185,302	41.9	La . . .	5,626,226	19.4

IMPROVED LAND

(Continued)

STATE	ACRES	PER CENT
W Va.	5,520,308	35.9
Oreg .	4,913,851	8.0
Idaho	4,511,680	8.5
Md . .	3,136,728	49.3
Fla. . .	2,297,271	6.5
Wyo.	2,102,005	3.4
Me. . .	1,977,329	10.3
N. Mex	1,917,224	2.2
Utah . .	1,715,380	3.3
Vt . .	1,691,595	29.0
N. J. .	1,555,607	32.4
Mass .	908,834	17.7
Ariz . .	712,803	1.0
N H. .	702,902	12.2
Conn .	701,086	22.7
Del . .	653,052	51.9
Nev . .	594,741	.8
R I . .	132,855	19.5
U. S. .	503,073,007	26.4

Courtesy of U. S. Department of Agriculture

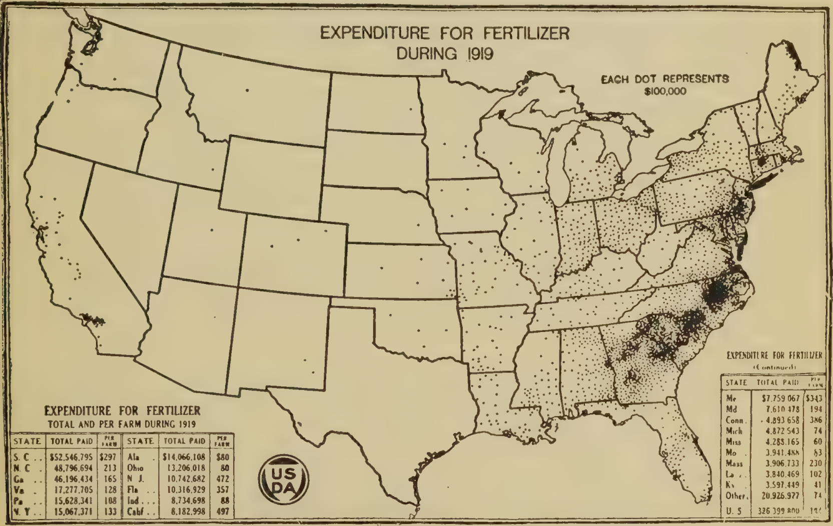
FIG. 80.—Improved Land in Farms in the United States, 1920.

sell his cattle when they are in poor condition and do not bring a good price.

(9) *The Irrigation Type.*—Along the western border of the Dry Plains, and interspersed among the ranches of the Rocky Mountain Cattle Country, and scattered here and there over all the dry region of the United States as far as California are great numbers of irrigation communities. Among all the types of farming in the United States the irrigation type perhaps approaches closest to the ideal so far as concerns its dependence on a variety of products, its certainty of good crops each year, and its general freedom from the droughts or wet spells which are usually the farmers' difficulties. Making the usual allowance for animals, the income of an irrigated farm in Utah County, Utah, in 1919 amounted to over $300 from animals, over $400 from grain, $700 from hay and forage, $600 from fruit and vegetables, a sum which rises higher if sugar beets are included, and nearly $300 from dairy and poultry products. The relatively small expenditure for labor, $243, indicates that the farmers and their families do most of the farm work themselves. They spend practically nothing for fertilizer because the soil is rich and new, and little for feed, since they raise all sorts of hay and grain at home. Inasmuch as an artificial water supply makes the irrigation farmer largely independent of rainfall, while the abundant sunshine and the rich soil of the dry regions assure him the other requisites for good agriculture, he can count on steady prosperity. Tenancy is rare and the percentage of native white farmers high. Perhaps this combination of many favorable conditions is one reason why the average child in Utah is in school more regularly and persistently throughout a long school year than in any other state in the Union.

(10) *The Fruit Districts.*—The fruit districts of the United States are very irregularly scattered. They include the grape, prune, and orange districts of California, the orange groves of Florida, the grape farms east of Lake Michigan and on the New York shores of Lake Ontario, the peach orchards in New Jersey, and the apple orchards of Oregon, New York, and New England. Therefore, Fresno County in California, the example here given, does not represent the general condition so well as do our other examples. On the whole, however, the other fruit-raising districts resemble those of Fresno in having farms of moderate but not excessive size and relatively high value. They are operated by the owners with relatively few tenants, but in most of the fruit districts the number of native white farmers is greater than the 50 per cent of Fresno County. Allowing one-fourth (Col. N) for the value of young animals raised each year, a Fresno fruit farmer in 1919 receives an income of about $1750 from various minor sources and

$4750 from fruit and vegetables. On many of the Fresno farms grapes form by far the larger part of the products. Here, as in many other fruit farms, the one-crop type of agriculture is rather strongly developed. It is less dangerous here, however, than in the wheat belt for example, since abundant facilities for irrigation prevent the yield from varying so much as in non-irrigated regions. In the East, a failure of the apple crop, such as occurred in New England in 1921, is a serious matter for the fruit farmer. Nevertheless, the fruit farmers all over the country are unusually prosperous. The high proportion of intelligent men among them is one reason why cooperation is unusually well developed, as explained in Chapter XI.



EXPENDITURE FOR FERTILIZER
TOTAL AND PER FARM DURING 1919

STATE	TOTAL PAID	PER FARM	STATE	TOTAL PAID	PER FARM
S. C. .	$52,546,795	$297	Ala .	$14,066,108	$80
N. C .	48,796,694	213	Ohio	13,206,018	80
Ga . .	46,196,434	165	N. J.	10,742,682	472
Va .	17,277,705	128	Fla . .	10,316,929	357
Pa . .	15,628,341	108	Ind . . .	8,734,698	88
N. Y . .	15,067,371	133	Calif . .	8,182,998	497

EXPENDITURE FOR FERTILIZER
(Continued)

STATE	TOTAL PAID	PER FARM
Me	$7,759,067	$343
Md	7,610,478	194
Conn.	4,893,658	386
Mich	4,872,543	74
Miss	4,283,165	60
Mo .	3,941,488	63
Mass	3,906,733	230
La . .	3,840,469	102
Ky .	3,597,449	41
Other.	20,926,977	74
U. S	326,399,800	134

Courtesy of U. S. Department of Agriculture

FIG. 81.—Expenditure for Fertilizers in the United States, 1919.

Taken as a whole the agriculture of the United States stands on a peculiarly firm basis. It is so varied that no probable conditions of weather or any other natural disaster are likely to throw the whole country into distress. The crops in one region may fail, but those in others are almost sure to be good. Railroads and other facilities of communication are so well developed that only in a few areas like the Allegheny Plateau are the farmers either unable to market their crops fairly cheaply and promptly or to bring in supplies and go out to find work elsewhere when the crops are poor. In addition to all this there are few countries where scientific agriculture is progressing more rapidly under the guidance of a great national Department of Agriculture and of large numbers of Agricultural Colleges and Experiment Stations. Farming will always be the most important of all occupations, for it provides the food and raw materials to support the other major industries. The United States is fortunate in having such highly developed and successful agriculture.

EXERCISES AND PROBLEMS

1. On a map of the United States locate the ten counties given in the table on page 344 (Farms of Ten Typical Sections of the United States). Shade the areas which you are sure belong to each of the ten types of farming. Explain which types form solid belts or areas and which are scattered. In which parts of the country are several types intermingled? Explain why and how.

2. Study the agriculture of your own region. From the State Supplement of the Statistical Abstract of the United States make for your own county and one other county not far away a table like that on page 344. How does your county compare with the other? With the nearest of the ten examples given in the text? With the one in the text most like your own? Write an account of the agriculture of your county modeled on the accounts of the various regions in the text.

3. Investigate the changes in the use of the land in your state since 1850. Find in the State Supplement of the Abstract of the Census a table showing the per cent of improved land in farms. From this draw a graph showing the changes. Draw another graph showing the increase in population since 1850. Compare the two and explain the reasons for whatever differences you find.

4. Let a group of students cooperate in preparing a table with the following headings to illustrate the agricultural conditions of your own state compared with those of other states.

1	2	3	4	5	6
Own State.	A state with decidedly different temperature conditions.	A state with decidedly different rainfall conditions	A state with similar climate but decidedly different relief.	Leading state in each agricultural condition.	Most backward state in each agricultural condition.

From the tables at the back of this book insert in your table the necessary names and figures to show the conditions set forth in Tables 2 A, 8 C, all columns of Tables 10, 16 to 19, 24, also Figs. 77 and 79, Tables 20 to 23, 35, 36, Fig. 33, Tables 43, 46 A compared with 46 B, and 48 A and B.

Let each student write an account of the differences between his own state and the others in certain respects, and explain the reasons for those differences. Bring all the accounts together into a well-rounded comparison of your state with others. Make maps to illustrate the account wherever it seems desirable.

5. Work out any of the problems of Chapters II, X, and XI, which pertain to the U. S. and have not already been done.

6. Study the problem of how the growing population of the United States can be supported. Experts estimate that the United States will probably have 150 million people by 1950 and 185 million by 2000 A.D. Practically all of our good and easily used land is now included in the 500 million acres reckoned as improved. How shall we support another 70 or 80 million people? Try to decide which of the following methods of adjusting the food supply to the growing population is being used now and is most likely to be used in the future. Decide which of the facts numbered I to XII below bear on the possibilities lettered A to F, and what tendencies they indicate.

POSSIBLE METHODS OF GETTING FOOD FOR MORE PEOPLE

A. *Reclaim good lands.*—(1) 30,000,000 acres highly fertile irrigable land; (2) 60,000,000 acres of drainable swamp land not quite so good. (Expensive, for the cheaply reclaimed lands are already irrigated or drained.)

B. *Cultivate poor lands.*—(1) Best half (80,000,000 acres) of cut-over and forest lands. (Easily reclaimed but would probably yield only two-thirds as much per acre as present cultivated lands); (2) all (50,000,000 acres) of unimproved pastures of East and dry-farming lands of West. (Easily reclaimed but probable yield per acre only 0.4 present average.)

C. *Increase yield per acre* to German or even Belgian standard wherever possible. (Table 13.)

D. *Cease using land for pasture.*—Feed animals in the barn, thus freeing improved pastures for crops, doubling their capacity to produce food, and practically adding 37,000,000 acres of good land.

E. *Change our diet.*—Substitute dairy products and vegetable oils for much of the meat now consumed. On the basis of calories, meat now supplies 23 per cent of the food of the United States, milk and dairy products 16 per cent, and vegetable products 60 per cent. The vegetable products are raised on only one-fifth of the improved land, while food for animals requires nearly four-fifths. The per capita consumption of meat (including poultry and lard) is about 170 pounds in the United States, 100 in Germany (before the war) and 4 in Japan. Reduction of meat consumption to a level between those of Japan and Germany might permit a doubling of the population even with present acreage of improved land and present methods of agriculture.

F. *Reduce the exports of food and increase the imports.*

FACTS BEARING ON TRENDS IN LAND UTILIZATION AND SUPPLY OF FOOD

I. Average yield of chief crops in the United States (bushels per acre).

Crop.	1870–1894	1895–1919.	Crop.	1870–1894.	1895–1919.
Corn..........	25.0	25.0	Buckwheat..	15.3	18.8
Wheat........	12.3	14.2	Potatoes.....	79.5	91.5
Oats..........	26.8	30.3	Hay.........	1.21	1.43
Barley........	22.2	25.0	Cotton......	174.9	181.8
Rye...........	13.1	15.6			

II. Pounds of meat consumed per year per person in urban versus rural districts, 1920.

Region	Urban.	Rural.	Region	Urban.	Rural.
North Atlantic States......	167	175	South Atlantic States.......	158	172
East North Central States..	177	196	South Central States........	178	182
West North Central States.	181	213	Western States............	178	188

III. Percentage of urban population.

1790..3.3	1820..4.9	1840.. 8.5	1870..20.9	1900..32.9
1800..4.0	1830..6.7	1850..12.5	1880..22.7	1910..38.7
1810..4.9		1860..16.1	1890..29.0	1920..43.8

IV. Number of cattle, sheep, and swine per person.

1880....2.15	1900....1.63
1890....2.35	1910....1.87
1920....1.77	

V. From 1909 to 1919, under the stress of the demand for more food during the war, the land in crops increased about 55,000,000 acres, of which about 30,000,000 was improved pasture land, and only 25,000,000 was land previously not improved.

VI. The eastern, long settled parts of the United States show a notable and widespread decrease in farm land from 1910 to 1920, but an equally marked increase in land and crops. In other words the farmers are giving up the poorer lands and cultivating the better lands more carefully.

VII. The exports of meat from the United States amounted to 17 per cent of the production from 1896 to 1905, and to 12 per cent from 1916 to 1920. The exports of wheat averaged 31 per cent of the production in the twenty years from 1880 to 1899 and 23 per cent from 1900 to 1919.

VIII.

	Percentage of Total Value,	
	1880–1899.	1900–1919.
Foodstuffs imported into the United States......	16.92	12.51
Foodstuffs exported from the United States.......	21.80	14.09

IX. Percentage of increase in areas irrigated by government projects.

1915 to 1916.............	13 per cent	1917 to 1918............	9 per cent
1916 to 1917.............	11 per cent	1918 to 1919............	6 per cent

X. The imports of edible vegetable oils into the United States were 2½ times as great in 1920 as in 1912.

XI. Approximate estimate of land available for crops or pasture.

Kind of Land.	Tropical and Sub-tropical Zones. Square Miles.	Temperate and Arctic Zones. Square Miles.
Total land area................................	23,000,000	29,000,000
Land too dry for crops.........................	8,000,000	7,600,000
Land too cold for crops........................	....	6,400,000
Land with adequate rainfall and heat...........	15,000,000	15,000,000
Probable part of this ultimately arable..........	5,000,000	5,000,000
Cultivated at present..........................	1,200,000	2,500,000
Arable land in pasture.........................	600,000	1,500,000
Unused arable land available for crops or pasture	3,200,000	1,000,000

XI. Two or more crops can be raised per year in tropical countries, but tropical labor is inefficient.

7. Study the reasons for the geographical distribution of tenancy. From Table 10, Col. I, draw an isopleth map of tenancy. Apply different colors to (I) the nine states where the percentage of tenancy among the farmers is greatest, (II) the nine standing next in this respect. Study your map in the light of the accompanying table which shows the average conditions in these two groups of states and in three others (10 states each) arranged according to the percentage of tenancy.

Groups of States.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.
					Per Capita Production of Crops.								
	Per Cent of Farms run by Tenants.	Per Cent Engaged in Agriculture.	Value per Farm.	Per Cent of White Farmers.	Wheat, Bushels.	Barley, Bushels	Oats, Bushels.	Corn, Bushels.	4 Main Cereals, Combined.	Potatoes, Bushels.	Tobacco, Pounds.	Cotton, Bales.	Hay, Tons.
I.....	56.8	55	5,263	62.0	4.5	0.1	7.6	28.1	40.3	1.3	19.6	0.48	0.4.
II.....	38.4	36	21,434	86.5	24.6	5.3	30.4	74.0	134.3	2.9	25.8	0.01	1.0
III.....	25.6	29	12,882	78.5	16.0	3.6	13.4	21.2	54.2	5.2	1.0	0.00	0.9
IV.....	17.6	26	14,877	78.8	11.2	3.1	8.1	10.3	32.4	5.4	3.1	0.05	1.4
V.....	9.4	28	13,136	79.6	7.5	1.4	7.0	4.2	20.1	8.5	3.2	0.00	2.5

What relation, if any, can you detect between the percentage of people engaged in agriculture and the *percentage* of those same people who are tenants? Does the presence of manufacturing with the corresponding reduction in the percentage of farmers help the farmers to own their farms? How can you be sure of your answer?

What indications can you see that both poverty and prosperity among the farmers tend to promote tenancy? How is this possible? Keep your explanation in mind, and see if it agrees with the one given later in this book.

What significance has the fact that in the preceding table, Col. D is low in Group I and high in Group II? In what crops do Groups I and II in the table excel? What relation have the cash value, salability, and durability of a crop to the spread of tenancy? Arrange the following products in the order in which you would rather have them as security for a loan: tomatoes, wheat, potatoes, cotton, corn, tobacco, oats. What relation has this to tenancy?

Why does Col. J of the table in this exercise (and to a less extent Col. M) show a regular increase as the amount of tenancy diminishes? In answering this consider climate, type of agriculture, number of farm animals, and the amounts of other crops as shown in the other columns.

Sum up your conclusions as to the conditions which accompany tenancy in different parts of the United States. Which are causes and which results?

CHAPTER XXVI

MANUFACTURING AS A SPECIALTY OF THE UNITED STATES

The Rank of the United States in Manufacturing.—In 1919 the total value of the manufactured products of the United States reached the enormous total of over 62 billion dollars. When we deduct the value of the raw materials, 37 billion dollars, there remain 25 billion as the value added by manufacturing. This is almost identical with the total value of farm products for the same year. The number of persons engaged in manufacturing and in agriculture in 1919 was also almost identical, being about 10,800,000. Since 1919 was a year of very high prices, 25 billion dollars then represents approximately as much as 15 billion would now. How the value of the manufactured goods in the United States compares with that in other countries cannot be determined, for the standards of value and the methods of keeping statistics vary greatly. Moreover, the Great War prevented accurate census returns in Europe, and still causes production there to be abnormal. This much, however, is clear: the activity of the United States, combined with its huge population, makes it today by far the greatest manufacturing country. Its chief manufacturing districts produce more per capita than any other parts of the world. Nevertheless, the United States stands second to western Europe, not only in the total amount of manufacturing, because of Europe's large population, but also in the percentage of the general population engaged in manufacturing (Fig. 54).

The Permanence of Manufacturing in the United States.—It is sometimes supposed that manufacturing is a relatively new development in the United States, and that it has grown amazingly in recent decades. This is partly true, but ever since the manufacturing era was ushered in by the steam engine, cotton gin, and other mechanical inventions, manufacturing has been an important industry in this country. For example, according to the census of 1810 the total annual value of manufactures amounted to $198,000,000, or $27.40 per capita in 1809. A century later the value was $20,672,000,000, or $224.50 per capita. These figures at first suggest that manufacturing in 1909 was about eight times as important as in 1809, but that is not correct, for the purchasing power of money increased greatly during the nineteenth century. For example, in 1849, the earliest year for which data are available, the average wage earner in factories received $246 per

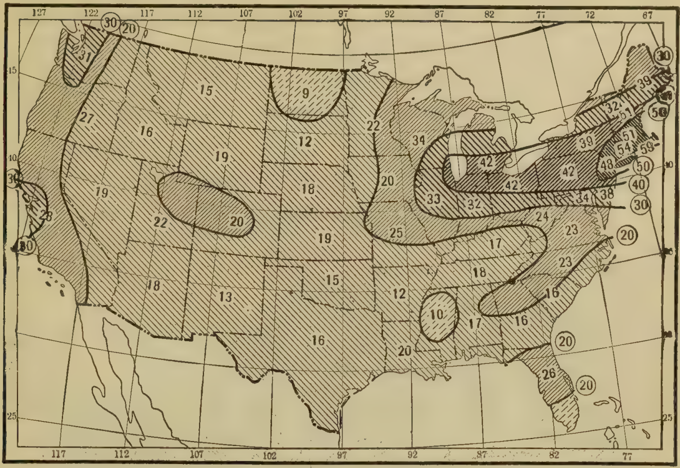


FIG. 82.—Percentage of Gainfully Employed Persons in the United States Engaged in Manufacturing, 1919.

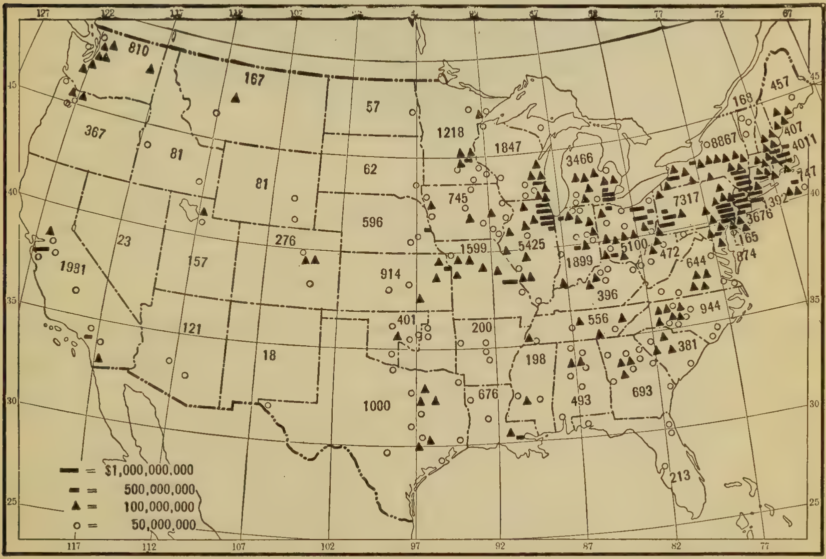


FIG. 83.—Total Value of Manufactures in the United States, 1919.

year, while in 1909 he received $518. Most of this difference was due to a general increase in the cost of living. In 1809 a dollar was worth fully three times as much as a century later. Thus the $27.40 of manufactures per capita in 1809 would have been worth over eighty dollars if the prices of 1909 had then prevailed. If we reckon in another way, the result is similar. In 1849 the wage earners in manufacturing industries numbered 4.1 per cent of the total population and in 1909, 7.2 per cent.* In 1809, the figure was probably not far from 2½ or 3 per cent, while in 1919, when the factories employed more than the normal number of people, it had risen to 8.6 per cent. The general conclusion to be drawn from all these figures is that as long ago as 1810 the manufacturing industries of this country were perhaps a third as important as today in proportion to the population. But even in England, where manufacturing first became important, the percentage of the total population engaged in manufacturing industries was apparently not much more than a third as great in 1809 as now. Hence it appears that in proportion to the population and to the degree of development of machinery, the United States has ranked high in manufacturing for at least a century.

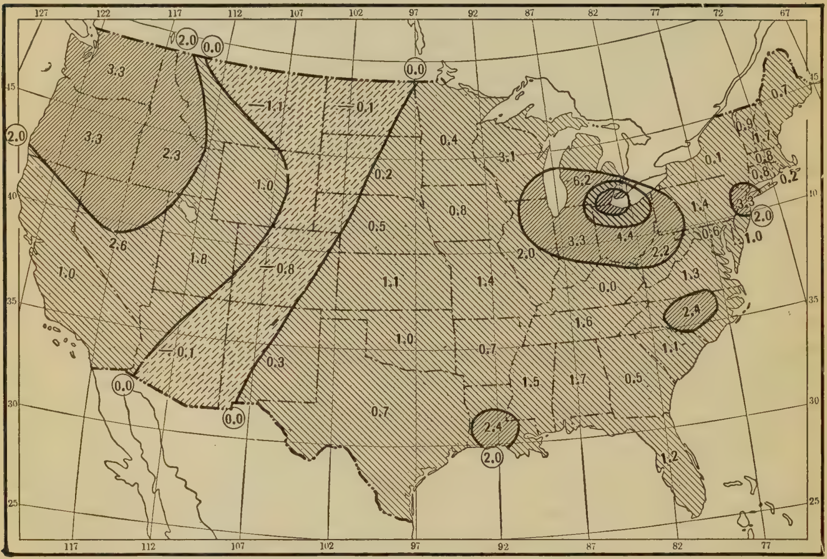


FIG. 84.—Growth in Manufacturing in the United States, 1899 to 1919.

Amounts by which the percentage of the total population engaged in manufacturing in 1919 exceeded the similar percentage in 1899.

The Places where Manufacturing Increases.—Manufacturing tends to remain in the same places generation after generation. It expands rapidly in new regions only under certain clearly defined conditions. For example, from 1899 to 1919 the percentage of the population engaged as wage earners in the factories of the United States increased from 6.2 to 8.6 per cent for the country as a whole. But this increase of 2.4 per cent was by no means distributed equally as appears in Fig. 84. A comparison of this with Fig. 82 shows that on the whole the greatest additions to the manufacturing population were in regions where manufacturing is already fairly well developed. The most rapid increase was in Michigan and Ohio where the lake transportation, nearness to coal and iron, nearness to the great market of the level farming states, and a location in the best climatic zone of the country helped to cause the automobile industry to become firmly established between 1900 and 1920. Other regions that showed a relatively large growth in manufacturing were New Jersey, West Virginia, Indiana, Illinois, and Wisconsin, all within or on the border of the area of most intensive manufacturing as shown in Fig. 82. The only other states that rivaled these were Oregon, Washington, and Idaho where another manufacturing center begins to show many resemblances to that of the North Atlantic and lake states, North Carolina with its cotton factories, and Louisiana with its sugar industry. The area where manufacturing is carried on with great activity is apparently expanding, but there is a strong tendency for the greatest expansion to take place where industry is already well established. Such regions seem to be especially adapted to manufacturing.

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* Proprietors, firm members and salaried employees are omitted because no record of their number is available before 1904.

The Distribution of Manufacturing in the United States.—A comparison of Figs. 35, 82, and 83 shows that the following eight areas can be differentiated according to the amount and nature of their manufacturing and the degree to which they seem fitted for industrial development: (1) a great manufacturing area along the North Atlantic coast from Maine to Maryland, or more specifically from Portland to Baltimore; (2) an almost equally important westward expansion of industrial activity from the North Atlantic coast approximately to the Mississippi River, chiefly in the Lake States, but extending to St. Louis, St. Paul, and Minneapolis; (3) a minor southward expansion evident in the cotton manufacturing of the Carolinas, and Georgia, the iron industry of Alabama, the sugar refining of Louisiana, and the tobacco factories of Florida; (4) a tendency toward westward expansion in Iowa, Kansas, Colorado, and Utah; (5) an important new area of industrial development along the Pacific coast; (6) a region of slight industrial development in the northern Great Plains and Rockies; (7) a similar region in the southern Great Plains and Rockies; and (8) a region of slight development in the lower Mississippi Valley and southern portion of the Appalachian Plateau.

The Types of Industry in Different Parts of the Country.—Another evidence that the various parts of the country vary greatly in their adaptation to manufacturing is found in the kinds of industries in different regions. In Chapter XV all industries were divided into three groups: (1) primitive, (2) simple, and (3) complex. The primitive, or home and hand industries may here be omitted. The simple industries, it will be remembered, are primarily those which prepare local raw materials for market, and in which the raw materials pass through only a few simple processes. For example, cotton ginning is the main simple industry connected with cotton, although the pressing of the seeds for oil falls in the same class. Cotton spinning is somewhat complex because it begins with a product that is already partially manufactured. The making of cotton dress goods with highly varied colors and patterns and perhaps with an intermixture of wool or silk is a higher and far more complex stage of the cotton industry. The table on page 366 gives a list of enough simple industries to suggest what they are like and how they are distributed in the United States. Part of the products at the heads of the columns are finally consumed in the form given them by the first simple process of manufacturing. This is usually true of artificial stone, butter, canned goods, cement, charcoal, and most of the products in the table. But the pig iron made in blast furnaces is almost wholly used as material for more complex manufacturing, such as the making of steel rails, bridge girders, engines, watches, and hundreds of other products. Butter, flour, and peanuts may be used in the complex manufacturing of bakery and confectionery products; grindstones may be used in the complex work of tool making; lime in the highly complex chemical industries; and lumber in complex furniture making. Thus the simple industry is the first step in preparing a product for market. It may also be the last step, as in the case of many food products and building materials.

In the table a cross indicates that the given product was made in the indicated state in sufficient quantities to be listed separately in the census of 1914. Notice how some articles like flour- and grist-mill products are made in every state, others like ice in every state except a few where some natural condition makes them unnecessary, and still others like canned fish, fertilizer, and shelled peanuts, in a relatively few states where the raw materials are readily available. Note that the simple industries are most numerous in the states where manufacturing in general is most active, provided those states are large enough to have abundant natural resources. Ohio, Illinois, and Pennsylvania stand high in this respect. A little state like Massachusetts with 24 simple industries, according to the complete table of the 1914 census, exceeds a great state like Mississippi which has only 17 simple industries, for the spirit of manufacturing prevails in the one case and not in the other. In the same way tiny Rhode Island (14) far exceeds great North Dakota (7), while little Connecticut (19) ranks almost with Texas (23).

Contrasted with the simple industries are the complex industries which produce such goods as electric fixtures, steam engines, cotton cloth, rubber tires, newspapers, bread, dyes, optical instruments, clothing, and hundreds of other articles. A few of these such as bread and the simpler kinds of cloth might almost be considered the products of simple industries, for the dividing line is not sharp, but the rest are clearly complex. Fig. 85 shows the number of complex industries for each simple industry in each state as listed in the census reports for 1914. Notice that this map is almost like Fig. 82 showing the percentage of the population engaged in manufacturing. In other words where a small proportion of the population is engaged in manufacturing, the simple industries that depend on local raw materials are relatively important. On the other hand where a large proportion of the population is engaged in manufacturing there is not only a great development of local simple industries, but still more of complex industries which depend upon raw materials from a distance, and in which the value added by manufacture is relatively great compared with the small value

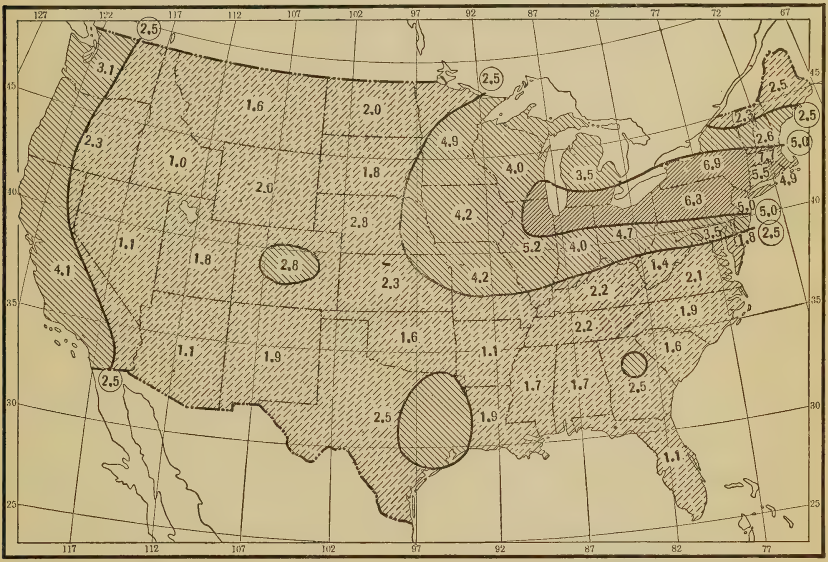


FIG. 85.—Number of Complex Industries for each Simple Industry, 1914.

DISTRIBUTION OF CERTAIN SIMPLE INDUSTRIES

	Artificial Stone.	Blast-furnace Products.	Butter, Cheese, Condensed Milk.	Canned Fish.	Canned Fruit and Vegetables.	Cement.	Charcoal.	Coke.	Fertilizer.	Flour and Grist-mill Products.	Grindstones.	Ice.	Lime.	Linseed Oil.	Lumber and Timber.	Lumber (Planed).	Peanuts (Shelled and Roasted).
Alabama	x	x			x	x		x	x	x		x	x		x	x	x
Arizona	x		x							x		x			x	x	
Arkansas	x				x					x		x	x		x	x	
California	x		x	x	x	x		x	x	x		x	x		x	x	
Colorado	x	x	x		x			x		x		x	x		x	x	
Connecticut	x		x		x				x	x		x	x		x	x	
Delaware	x		x	x	x				x	x		x			x	x	
Florida	x			x	x				x	x		x			x	x	
Georgia	x				x				x	x		x			x	x	
Idaho	x		x		x					x		x			x	x	
Illinois	x	x	x	x	x	x	x	x	x	x		x	x		x	x	
Indiana	x	x	x		x	x		x	x	x		x	x		x	x	
Iowa	x		x		x	x				x		x			x	x	
Kansas	x		x			x				x		x				x	
Kentucky	x		x		x			x	x	x		x	x		x	x	
Louisiana	x			x					x	x		x			x	x	
Maine	x		x	x	x				x	x			x		x	x	
Maryland	x		x	x	x				x	x		x	x		x	x	
Massachusetts	x		x	x	x					x		x	x		x	x	
Michigan	x	x	x		x	x		x		x		x	x		x	x	
Minnesota	x	x	x		x					x			x	x	x	x	
Mississippi	x			x	x				x	x		x			x	x	
Missouri	x		x		x		x		x	x		x	x		x	x	
Montana	x		x							x					x	x	
Nebraska	x		x		x					x		x				x	
Nevada	x									x		x					
New Hampshire	x		x		x					x					x	x	
New Jersey	x		x	x	x	x			x	x		x	x		x	x	
New Mexico									x	x		x			x	x	
New York	x	x	x	x	x	x				x		x	x	x	x	x	
North Carolina					x				x	x		x	x		x	x	x
North Dakota	x		x							x						x	
Ohio	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Oklahoma	x		x		x					x		x	x		x	x	
Oregon	x		x	x	x					x		x	x		x	x	
Pennsylvania	x	x	x		x	x		x	x	x		x	x		x	x	x
Rhode Island	x									x					x	x	
South Carolina					x				x	x		x			x	x	
South Dakota	x		x				x			x					x	x	
Tennessee	x	x			x		x	x	x	x		x	x		x	x	
Texas	x		x		x	x			x	x		x	x		x	x	x
Utah	x		x		x	x				x		x	x		x	x	
Vermont			x							x			x		x	x	
Virginia		x	x	x	x			x	x	x		x	x		x	x	x
Washington	x		x	x	x	x				x		x	x		x	x	
West Virginia	x				x			x		x		x	x		x	x	
Wisconsin	x	x	x	x	x					x			x		x	x	
Wyoming			x							x					x		

added by such simple operations as grinding flour or converting cream into butter. This contrast between the types of manufacturing in the strongly industrial districts would be still greater if we omitted such almost universal occupations as ice-making, printing, railroad shops, bakeries, and tailoring establishments. If that were done we should

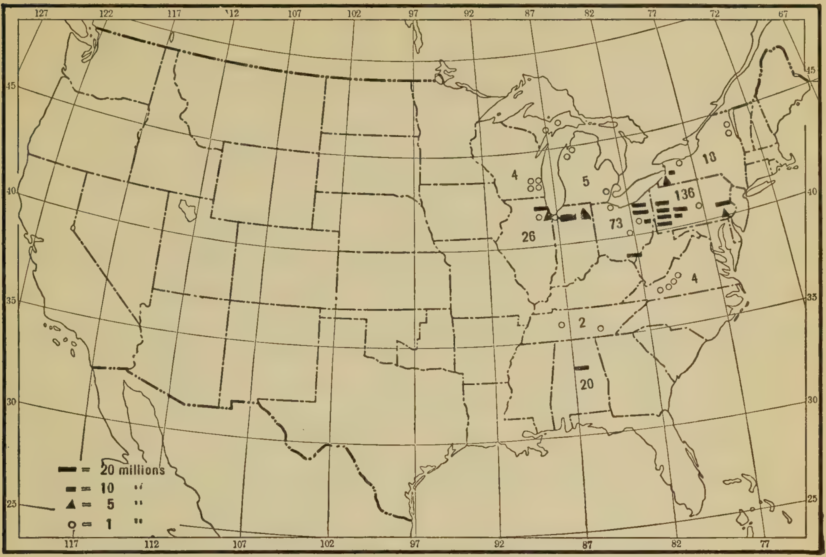


FIG. 86.—Value of Production of Blast Furnaces in the United States, 1914.

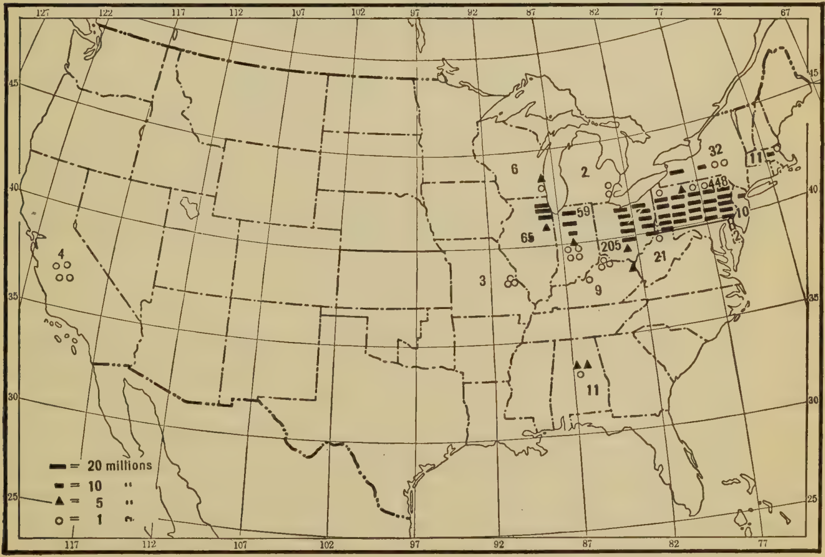


FIG. 87.—Value of Production of Steel and Rolling Mills in the United States, 1914.

find that the complex industries are even more localized than is shown in Fig. 85.

The Iron Industry as an Example of Simple versus Complex Manufacturing.—The iron industry affords an excellent example of the way in which a simple industry is located where the raw material or fuel is found, while the corresponding complex industry follows other rules. Fig. 86 shows the value added by manufacture in the blast furnaces in 1914. In a blast furnace, it will be remembered, iron ore is mixed with coke and limestone, and air heated to about 1500° F. is introduced. The heat allows the non-metallic parts of the ore and other impurities to combine with the lime, while the molten iron drains into pits from which it can be run off to make pig iron. Each ton of ore demands about two tons of coal and one of lime. Therefore the regular method is to carry the ore to places where both coal and lime are locally available. Hence, Lake Superior ore is shipped in large quantities to western Pennsylvania and eastern Ohio; some goes to other lake cities, and some is smelted at Duluth with coal brought in the returning ore ships. The Birmingham region has the advantage of having coal, iron ore, and lime all together. Thus in Fig. 86 the distribution of the simple blast furnace industry can be almost wholly explained by the location of the raw materials and fuel and by the facilities for transportation by water.

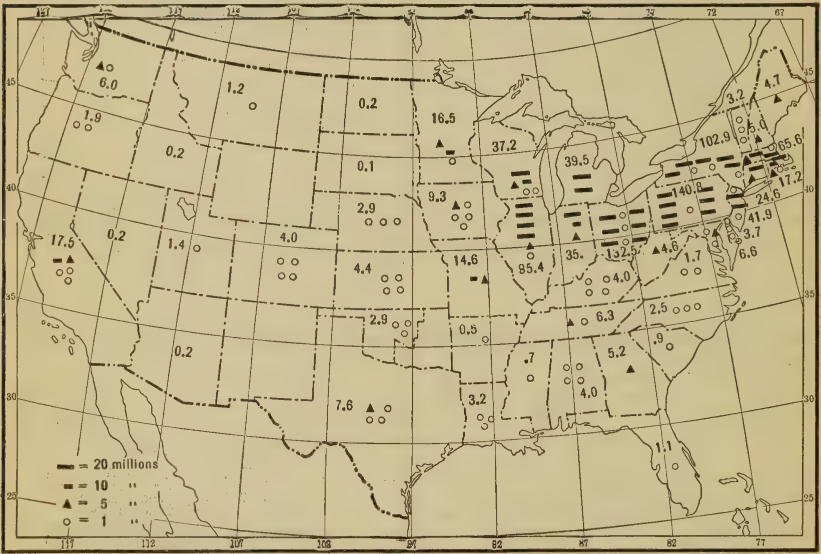


FIG. 88.—Value of Production of Foundries and Machine Shops in the United States, 1914.

Turn now to Fig. 87, showing the value added by manufacture in steel and rolling mills where steel is prepared in large masses like rails, plates, and girders, but is not put into final form as part of machinery. In proportion to the value of the raw materials the value added by manufacture is much greater than in the blast furnaces. This is because we are now dealing with a complex industry in which expensive machinery and large amounts of labor are required. This industry centers chiefly in the northern pig-iron area, but spreads out to the Atlantic coast and Mississippi River. Alabama does not have enough steel and rolling mills to rank high in Fig. 87 although it stands fourth in Fig. 86. On the other hand Massachusetts, New Jersey, New York and Indiana, all join with Pennsylvania, Ohio and Illinois in surpassing Alabama in Fig. 87. This illustrates the way in which the more complex industries tend to be concentrated in the northeastern quarter of the country.

In Fig. 88, showing foundries and machine shops, the process of carrying the iron and steel away from where they were produced to the areas of active manufacturing, especially in New England but also in the Middle West and on the Pacific slope, has gone still farther. The early settlement of New England gave it a start in preparing machinery for its own cotton and woolen mills, and thus in supplying the whole country with machinery. On the other hand Alabama practically disappears when it comes to making highly complex articles like machinery and implements. If a map of agricultural implements were added to the present series we should see that the center of production shifts to Illinois to be near the great farming districts, but it still remains in the same general latitude as in Figs. 86 to 88.

How Complex Industries Differ from Simple Industries in Location. —A study of other industries shows a similar variety of circumstances which combine to determine the distribution of production. For example, although the number of cattle per capita (Table 22, Cols. C and D) varies from 0.05 in Rhode Island to 4.61 in Nevada, there is no state which has not a considerable number. Yet the slaughtering and meat packing industry is largely concentrated in Chicago, Kansas City, and the surrounding regions, with minor centers on the North Atlantic coast and at San Francisco. In other words the raw material, in the shape of live cattle, sheep, and swine, moves toward the manufacturing centers where the demand is greatest. In order to be made into boots and shoes the leather derived from the cattle is still further concentrated. Far and away the greatest production of shoes in proportion to the population is in Massachusetts and New Hampshire. A large part of the men who raise cattle in New Mexico, for example, or slaughter them in Kansas City or Chicago wear boots made in Brockton or other

Massachusetts cities. Other regions, especially St. Louis, make many shoes, but only a negligible number are made south of Virginia and Kentucky and west of Missouri and Minnesota. The only important exception is California, which is beginning to make a good many. In fact San Francisco and the cities of the Willamette Valley and Puget Sound region show many indications that in time they will develop manufacturing industries much like those of the eastern seaboard.

A comparison of the cotton manufacturing and hosiery industries likewise shows a tendency toward a change in location as the industry becomes more complex. Cotton manufacturing centers largely in New England because that region got an early start, and because it has the greatest skill, but the industry has grown up in the South because of the presence of cotton together with fairly good water power and a supply of labor among the Poor Whites. But only the coarsest grades of cloth are usually made in the South, while relatively high grades are made in a large number of the northern mills. The hosiery industry also is strong in the North and weak in the South. Like the steel industry it is most highly developed in a belt running from New England to the Mississippi River. It developed in Pennsylvania and New York partly because of the chance location of certain people such as the Germans at Germantown. From there it was carried to the Mohawk Valley so that eastern Pennsylvania and central New York are chief centers.

In the case of industries where the raw material is of small bulk or light weight so that transportation plays only a minor part in the price, a still greater concentration is seen. For example, the silk industry of the United States is overwhelmingly concentrated in New Jersey, eastern Pennsylvania, and Connecticut, and is recorded in the 1914 census in only six other states, all on the Atlantic coast from Massachusetts to Maryland. In other words the industry is practically restricted to the old manufacturing region of the Atlantic seaboard. The bronze and copper industry shows a similar concentration in Connecticut, but is growing in importance in all the states from Maine and Maryland on the east to Missouri and Minnesota on the west, and again in the three states of the Pacific coast. Aside from a few factories in Texas it is not found in any of the southern or Great Plains states, and aside from a small development in Colorado and still less in Utah the industry is not developed even in the Rocky Mountain and Great Basin states from which the country's copper supply is chiefly derived. Copper, unlike iron, is not often used for massive articles. It is chiefly made up into small and rather highly manufactured products like the wire coils of motors and dynamos, the parts of electric lights, and various fittings of machinery and furniture where it often is used in the form of brass. Hence its weight is a small item in the ultimate cost, and it is manufactured in the regions where manufacturing is already most active and where the brass and copper plants can be near the electrical and automobile factories and other consumers on whom they depend for orders.

The Factors that Determine where Manufacturing shall be Active.—In considering the factors that determine where manufacturing shall be located it must be remembered that sometimes one factor is most important and sometimes another. One factor may determine the general location of an industry, while still another may determine its exact position. (1) Climate, through its relation to health and energy, is as important in the United States as in the rest of the world. Its part in determining the degree of activity of manufacturing may be judged somewhat from the strong resemblance between Figs. 22, 23, 82, and 85. It is also evident from Fig. 18 which shows how the health and energy of factory operatives vary from season to season in close harmony with the weather. It cannot be made too clear, however, that climate and health are chiefly important in determining the degree of activity and not its kind. Moreover, they do not prevent other conditions such as transportation or the age of a community from having an equally marked effect.

(2) The importance of transportation in determining the location of American industries is evident in the fact that among the manufacturing cities of the United States with a population of over 500,000 in 1920 every one is provided with water communication. Except for St. Louis and Pittsburgh these cities are all on the ocean or Great Lakes. Another evidence of the importance of transportation is the concentration of American manufacturing in strips along: (*a*) the North Atlantic coast, (*b*) the shores of the Great Lakes, (*c*) the Pacific coast and the Willamette Valley, (*d*) the Ohio and Mississippi rivers, and (*e*) certain railway lines such as the New York Central.

(3) A vast number of American industries owe their location to the presence of raw materials. The making of brick, the ginning of cotton, the canning of fish or fruit, the sawing of lumber, and the dressing of rock are almost invariably carried on where the raw material is produced or else where transportation by water enables the bulky raw material to be carried easily and cheaply to some more convenient place.

(4) The presence of fuel or water power has a similar effect in determining the location of industries, especially those of a simple type. We have already seen how this works in the case of blast furnaces. In some cases such as ore smelting, the location of the industry depends upon the complex balance between the cost of transporting the raw ore, the

cost of transporting the coal or of obtaining hydroelectric power, the cost of carrying the finished product to market, and the presence of skilled labor, as well as several other factors. Thus some South American ore comes to northeastern New Jersey to be smelted, because that is the cheapest method, when all things are considered.

(5) A supply of labor is quite as important as any of the other factors. That is one reason why the Atlantic coast maintains the lead in manufacturing. When European immigrants reach the United States they naturally go to work in the factories of the coast rather than in those that are farther away. The skill of the labor supply is as important as its volume. In some of the cotton towns of Massachusetts, such as Fall River, or the brass towns of Connecticut, such as Waterbury, there is a large body of workmen skilled in certain industries. New industries of the same sort can be established elsewhere only by bringing workers from a distance, or by a slow and costly process of training new ones.

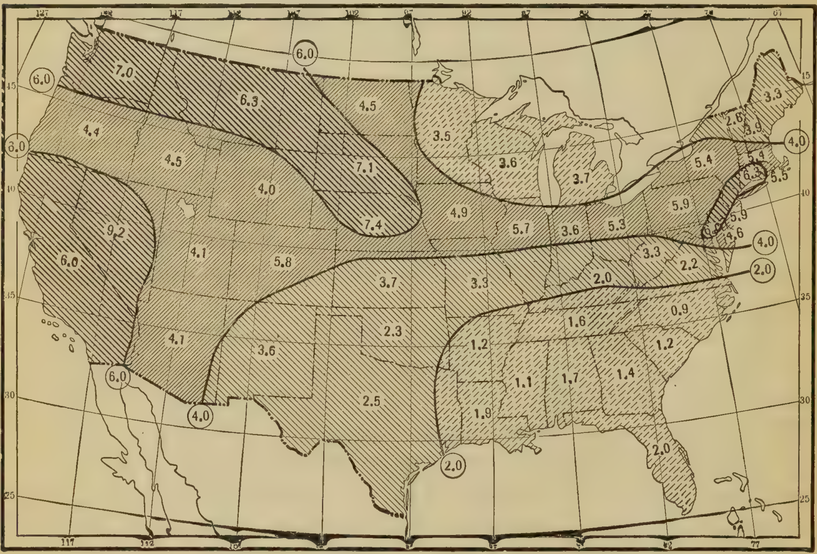


FIG. 89.—Percentage of Population Paying Income Tax, 1918.

(6) An industry needs capital as well as raw materials, fuel and labor. Hence the presence of capital influences the location of many industries in the United States. Fig. 89 indicates the relative abundance of capital in various parts of the country, for where many people pay income taxes there is surplus capital for investment. A better

guide to the distribution of capital is found in the average income per person among those who actually pay the tax, as given in Col. D, Table 46; the larger the incomes the more money people have to invest. Although many investments are made in distant regions, it is almost always easier to get capital for a local industry than for one far away.

(7) The sale of goods is as important as the making of them. Hence the presence of a market is one reason for the establishment of many industries. For example, the Pacific coast might buy its manufactured goods from the East, or the East might buy from Europe. But in both cases there is a growing local market, and the tendency is to supply that market with goods made locally, and thus reduce transportation charges. Of course many other factors enter into the matter, so that one cannot say that any one is the sole cause of the location of an industry. San Francisco and Seattle would probably not be such flourishing industrial centers if they were located in a hot climate, if they were not on the seacoast, if they did not have some raw materials such as lumber, if they were not able to bring coal by sea, if they were not large enough to begin to have a surplus population to draw on for new industries, and if they did not have a good supply of capital. But all these conditions would not cause manufacturing unless they were accompanied by a market in which the manufactures can compete with those of other regions in fairly equal terms. As a matter of fact the Pacific coast is less favored than the Atlantic in most of the conditions that lead to manufacturing, and hence cannot manufacture as cheaply as can the eastern states. But the fact that the Pacific coast has its own market west of the Rockies and that it there has a decided advantage over the East in transportation charges joins with cheap water power and petroleum in making it easy for industries to expand.

(8) Certain accidental causes also may determine where manufacturing is located. The original choice of Troy for a collar factory, Gloversville for gloves, Bridgeport for brass, Lynn for shoes, and Detroit for automobiles was more or less accidental. That is, the general region in each case was favorable, but if the first factories had been located fifty or a hundred miles away in some similar location they might have been equally successful. When once an industry is established, it is easy for other factories of the same kind to come in. They can draw a few skilled workers from the old plants, and thus get under way. The lines along which raw materials and fuel are brought are already established, the selling avenues are open, and people who have money to invest know that the business has already succeeded. Such considerations have much to do with the fact that particular kinds of business tend to cluster in limited areas.

(9) Another accidental cause is the mere question of age. Since New England was already fairly well settled when machinery was first applied to manufacturing on a large scale, while western New York was the frontier, and Ohio and the states farther west were a wilderness, many New England industries obtained a start which has given them an almost unshakeable lead. But when a country begins to manufacture a new product like automobiles, maps, cameras, or moving-picture films, a new industry has a chance to develop in places like Detroit, Chicago, Rochester, and Los Angeles.

From all this it appears that while the general activity of a region in manufacturing depends largely on the character and energy of the people, the exact location of any special industry depends upon a great variety of interacting causes.

EXERCISES AND PROBLEMS

1. From Col. B, Table 31, prepare an isopleth map using such intervals and such types of shading that you bring out the eight areas named on page 362 and show the relative intensity of their manufacturing interests. In making this map let the isopleths be at irregular intervals if necessary. The presence of large cities with their high percentage of factory people makes it right to draw the isopleths in such a way that cities like Baltimore, St. Louis, St. Paul, and Minneapolis, are included within areas where the manufacturing activity is greater than in their states as a whole.

In which of the eight areas does your home fall? In the State supplement of the Abstract of the last census look up the number of persons engaged in manufacturing in your own city or the nearest city with over 50,000 inhabitants, and calculate what percentage they form of all the persons engaged in gainful occupations. How does your city compare with your state in this respect? How and why does it differ? What part of the United States does it most resemble in its proportion of factory workers?

2. In the supplement to the Abstract of the Census or in a special Census bulletin find the table of the individual industries of your own city or of the nearest city of over 50,000 inhabitants. Divide the industries into two lists (*A*) simple industries, and (*B*) complex industries. In each list arrange the industries according to the total number of persons engaged in them. Insert (*a*) total number of persons engaged in industry, (*b*) number of establishments, (*c*) capital, (*d*) wages of wage earners, (*e*) taxes, (*f*) expenses for principal materials, (*g*) value of products, and (*h*) value added by manufacture. Complete the table by adding the names and places of origin of the chief raw materials. Use the table as the basis of a report on the manufacturing of your city with special reference to (1) the degree of complexity of the industries, (2) the regions upon which they rely for raw materials, (3) the degree of importance of the different industries as measured by the number of workers, the *local* expenditure of money, and the payment of taxes.

3. Choose some city which you think is quite different from your own and treat it as your own was treated in Ex. 2. Write a report on the way in which geographical conditions cause the industries of that city to differ from those of your own.

4. In the accompanying table twelve groups of industries are arranged according

to the number of wage earners in 1914. Compare the textile group with some other in the following respects: (*A*) Wage earners per factory. Explain why the factories are large or small. (*B*) Capital per wage earner. What relation has this to amount and complexity of machinery, cost of raw materials, and degree to which they have been manufactured? (*C*) Wages per year, as influenced by (*a*) amount of skilled labor, (*b*) number of women employed, (*c*) seasonal character of industry. (*D*) Cost of materials per wage earner. Does a high cost mean that much or little value is added by manufacture as shown in Col. J? Explain. (*E*) Percentage of value added by manufacture. Consider effect of degree of skill, amount of machinery, degree to which raw materials have already been partly manufactured, etc.

5. Select an industry in your own town which falls in one of the groups in the table. Find out as much as possible about it along the lines of the table and as to where and how it gets raw materials, where and how it sells its products, how far it is seasonal and why, percentage of women employed, etc.

SUMMARY OF TWELVE GENERAL GROUPS OF INDUSTRIES, 1914

A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
Group.	Number of Establishments.	Wage Earners Average No.	Capital.	Wages.	Average Wages per Year.	Cost of Materials.	Value of Products.	Value added by Manufacture.	Per Cent of Value added by Manufacture.
	Thousands.		Millions of Dollars.		Dollars.	Millions of Dollars.			
All industries	276	7036	22,791	4078	500	14,368	24,246	9878	40
1. Textiles and their products	23	1499	2,811	672	448	1,993	3,415	1426	42
2. Iron and steel products	18	1061	4,282	723	680	1,762	3,223	1461	45
3. Lumber and its manufactures	42	834	1,723	440	528	762	1,600	837	52
4. Food and kindred products	59	496	2,174	278	561	3,828	4,816	988	20
5. Paper and printing	37	453	1,433	296	696	581	1,456	875	60
6. Railroad repair shops	2	366	418	253	606	261	553	291	3
7. Stone, clay and glass products	15	335	987	205	612	239	614	375	61
8. Leather and its finished products	7	307	743	169	550	753	1,105	351	32
9. Chemical and allied products	12	300	3,034	167	558	1,289	2,002	712	36
10. Vehicles for land transportation	10	263	803	197	750	587	1,034	448	43
11. Metals and metal products (other than iron and steel)	10	262	1,014	167	637	1,023	1,417	394	28
12. Tobacco manufactures	14	179	304	78	437	207	490	283	58

6. Determine which industries are most widely spread in the United States. Let two students working together make a list showing the names of all the manufacturing industries mentioned in Table 32, and the number of states in which each is mentioned. Explain the reason why two manufacturing industries stand among the three most important in so large a proportion of the states.

7. Shade heavily the states in which railroad shops are the most important industry, less heavily those where they are second, and lightly those where they are third (Table 32). How far is their importance in the first group of states related to (*a*) the railroad mileage per square mile? (Make an isopleth map from Table 37 C) (*b*) the railroad mileage per inhabitant (Table 37 B)? (*c*) the general prevalence of manufacturing (Fig. 82)? Explain the industrial contrast between the states where rail-

road shops are the foremost manufacturing or mechanical industry, and those where they fail to come among the first three industries.

8. Draw for lumber mills a map like the map of railroad shops in Exercise 7. Explain the peculiar features of the distribution of such mills in relation to (*a*) relief, (*b*) sparsity of population, (*c*) the amount of manufacturing.

9. On an outline map insert the name of the most important manufacturing industries omitting railroad shops and lumber mills, and also printing establishments because printing is an almost universal industry. Where foundries appear on your map add the name of the next succeeding industry, for foundries likewise are almost universal in modern civilization. Shade on your map the types of areas given below, and determine for each the degree of activity of manufacturing and its character as shown in Figs. 36, 82, 83, 84, and 85; also point out in each case the relation of the given industry to local raw materials, and its importance to the country as measured by the number of persons actually engaged in the industry in the regions where it appears on the map: (*a*) Areas where relatively simple food industries predominate. Explain the distribution of the three areas of this type. What two states need to be shaded in order to unite the three into a single area? Why are those states not shaded? How highly are the food-producing industries developed in them? (*b*) Areas where manufactures of cotton and clothing are relatively important. Explain the contrast between the two areas in this case. How does the percentage of persons engaged in manufacturing compare in these areas? (*c*) Iron work including automobiles, engines, and foundries. What relation do these industries show to raw materials and fuel? Why? (*d*) Shipbuilding states. Explain the grouping here. (*e*) States where your map is blank because no manufacturing industries other than railroad shops, lumbering, printing, or foundries fall among the first three. (*f*) States engaged in other industries. In each state of this group explain the relation of the industry to raw materials. In which cases are raw materials produced locally? In which are the raw materials limited almost to a single article? Which require that large amounts of fuel be brought from elsewhere? To what degree does each require complex machinery, large factories, and abundant capital? Which is the most complex?

10. From Table 32 or from the Census make a list showing the industries which employ at least 90 per cent of the persons engaged in manufacturing in your state. From the city tables of the census prepare a map showing the predominant manufacturing industry in various parts of your state. Explain the causes of the distribution shown on your map.

11. Review the exercises on the United States in Chapter XV, and work out any of them which have been omitted.

CHAPTER XXVII

TRANSPORTATION AND COMMUNICATION IN THE UNITED STATES

The Complexity of the American Transportation System.—A complete transportation system, as we have seen, consists of three parts: (1) ways, (2) vehicles, and (3) terminals. The ways consist of (*a*) roads which may range anywhere from mere trails up to the finest concrete or macadam avenues; (*b*) railways of every type from portable tracks a foot wide up to 6-track roads like part of the New York Central; (*c*) waterways, which include both the open ocean and inland waters; and (*d*) the ways of the air, which are not yet defined but are none the less important. The vehicles range all the way from pushcarts propelled by men up to the most highly powered automobiles, trains half a mile long, steamships large enough to accommodate a small city, and airplanes that can travel 200 miles an hour. The terminals in a broad sense include anything from a place on the side of a street where an automobile can park up to a freight yard with hundreds of tracks and scores of warehouses, or an enormous dock flanked by huge wharves covered with tracks and equipped with all sorts of complicated loading machinery. The United States contains practically every type of way, vehicle, and terminal, for the complexity of the transportation system is probably greater there than in any other country.

The Development of the American Road System.—The rural roads of the United States, in distinction from the city streets, have a total length of about 2½ million miles. About 300,000 miles are now nominally improved, but in many cases they have been treated only with sand and clay, with gravel, or with so-called waterbound macadam, and are proving entirely inadequate for automobile traffic. So important are the roads that in 1919 about 450 million dollars were spent upon rural roads and bridges in the United States, nearly 200 million being provided by local communities, more than 200 million by the states, and over 50 million by the Federal Government. In later years still larger sums have been spent, the Federal Government having appropriated about 80 million per year in 1920 and 1921. Various states are also providing large bond issues for the building of roads, for example, Minnesota, 75 million; Illinois and Missouri, 60 million each; Michigan, Pennsylvania, and West Virginia, 50 million each.

In spite of these large expenditures the roads of the United States and likewise of Canada are much less well developed than those of Western Europe. This is partly because the population in America is relatively sparse and partly because Western Europe had completed an admirable road system before railways began to be used. The United States and Canada on the contrary were just beginning to make good roads when the railways checked this improvement. People invested their money in railways and thought that that would solve their transportation problems. Today, however, the automobile makes people realize the enormous importance of roads. Moreover, since people now travel long distances by automobile, the roads are ceasing to be a local affair and are beginning to have state-wide and even national importance. A poor township with almost no population may be traversed by a highway over which hundreds or even thousands of automobiles travel each day. The building of 6 or 8 miles of good road to stand such traffic may cost three or four hundred thousand dollars, or possibly as much as the entire value of the property in the township. Obviously the town cannot pay for such a road and should not be asked to. Hence the responsibility for the main roads is rapidly passing from the townships and counties to the states. In fact the responsibility for the most important roads is being assumed by the nation as a whole and it is planned to make the Lincoln Highway from coast to coast a national road of the finest type.

The degree to which good roads are developed is shown fairly well in Fig. 33, which indicates the percentage of surfaced roads. It must be remembered, however, that the degree of excellence of so-called surfaced roads varies greatly in different regions. The map shows that the following factors all help in the development of good roads: (*a*) a dense population as in New Jersey, (*b*) long settlement as in Massachusetts, (*c*) a high degree of prosperity as in California, and (*d*) levelness as in Indiana.

Some idea of the growing part played by roads in American life may be gathered from the following table showing some of the American road industries. The road and bridge contractors and the people who furnish material for the roads have a capital of perhaps 600 million dollars. The makers of automobiles and wagons have 10 times as large a capital. This is a third as much as the capital value of all the railroads of the United States which the Interstate Commerce Commission estimates at $18,900,000,000, or about 7 per cent of the total wealth of the country.

THE AMERICAN ROAD INDUSTRIES 1920.

	Number.	Capital.
I. Road Engineering.		
Highway officials	80,000	
Civil and highway engineers	15,000	
Automotive and chemical engineers	10,000	
II. Road Building.		
Road contractors	7,000	$65,000,000
Bridge contractors	2,000	
	Number of Firms.	
III. Equipment for Highway Transportation.		
Manufacturers of equipment	7,000	$6,000,000,000
Raw material:		
Sand and gravel	340	9,000,000
Crushed stone	300	28,000,000
Portland cement	206	337,000,000
Paving bricks	127	18,000,000
Wooden paving blocks	46	4,500,000
Asphalt	42	126,000,000
Granite paving blocks	23	6,000,000
Miscellaneous	185	21,000,000

The Main Problems of American Roads.—Three of the great problems in American roadmaking today are: (1) How a single road can accommodate horse-drawn traffic, heavy and relatively slow truck traffic, and rapid traffic in passenger cars. On the main highways it is almost impossible to accommodate all three. In a few places near the big cities separate roadways for trucks and for passenger traffic have been constructed but this is very expensive. (2) Who is to pay for the roads? This means not only how much shall be paid by township, county, state, and nation, but how much of the expense shall be borne by the users of the roads. A heavy auto truck wears out the roads far faster than a light touring car. Already the license rates for the different types of cars vary, but the rates by no means represent the relative wear and tear on the roads. (3) How can durable roads be built without undue expense? This has been discussed in Chapter VIII. It is particularly important for the United States and Canada, for nowhere else is there so much automobile traffic. The fact that in North America the automobile now creates the greatest need of good roads is beginning to lead to a development like that of Europe, but the problem is now far more difficult than formerly because of the increased wear and tear due to motor vehicles.

The Railway Conditions of America.—What the United States and Canada lack in roads they partly make up in railways. Including the whole United States and the southern quarter or chiefly inhabited part of Canada the two countries together have an area of approximately four million square miles or roughly that of Europe. In that area the American countries have about 300,000 miles of railways while the European countries have 200,000. More trains per mile of track, however, are run on the European railways than on those of America. Nevertheless, the general facilities for railway transportation in proportion to both the area and the number of people are much better in North America than in Europe.

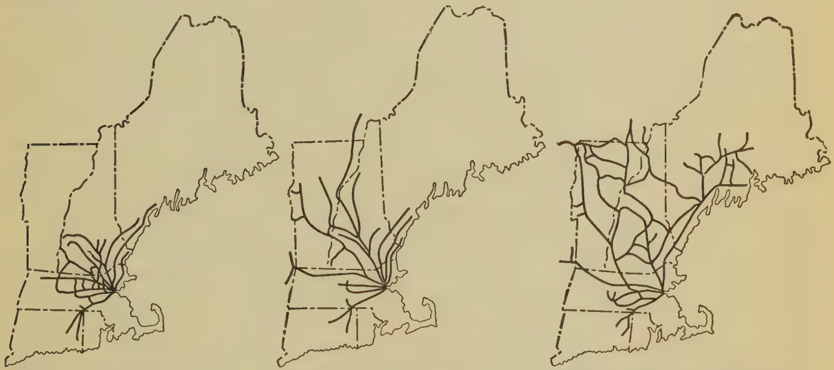
Keystone View Company.

FIG. 90.—A Locomotive Factory at Philadelphia.

The enormous part played by railroads in the United States may be judged by the fact that under the rates effective in 1920–1921 the country's total annual bill for railroad service was nearly 7 billion dollars, about a quarter for passenger service and the rest for freight. The percentage of profit on the passenger service is now greater than on the freight service although formerly it was less.

One of the most striking features of the American railways is the great trunk lines. In the United States many of the main systems are operated under one management from the Atlantic coast to Chicago, St. Louis, or New Orleans, and under another from these places to the Pacific coast. In Canada much longer stretches such as the Canadian Pacific and the Grand Trunk and Grand Trunk Pacific are operated under a single management. There a single train or at least individual cars run from tide water on the east to tide water on the west. Nowhere except on the Siberian railway is so long a stretch of line run as a single unit. Curiously enough in the United States no trains and not even individual sleeping cars run regularly all the way from the Atlantic coast to the Pacific. Nevertheless even in the United States the length of line operated as a single unit far exceeds that in any part of Europe except Russia.

The long distances covered by American railways has been one of the factors in causing American cars to be very large and easy riding compared with those of Europe. The sleeping and dining cars are largely an American product and nowhere else are they nearly so common as here. Freight cars in the United States and Canada are also much larger than in other parts of the world. They are also of highly specialized types such as those for fruit, stock, coal, oil, lumber, and general merchandise.



SOURCES OF RAILROAD MILK IN 1900—COMING LARGELY FROM MASSACHUSETTS, AND SOUTHERN NEW HAMPSHIRE

SOURCES OF RAILROAD MILK IN 1910—SHIPMENTS COMING FROM VERMONT, NEW YORK AND CANADA

SOURCES OF RAILROAD MILK IN 1920—ALL VERMONT SHIPPING AND LARGE SHIPMENTS FROM MAINE

FIG. 91.—Milk Routes Leading to Boston, 1900, 1910, and 1920.

In the matter of equipment American railroads are still far from ideal. Only 36,000 miles of the 236,000 in the United States are double-tracked; only 38,000 are under the automatic block system, and only 102,000 under any block system. Another great deficiency is the extent to which the ordinary freight car remains idle. The following table shows what happens to a typical freight car during the 52 weeks of a normal year:

On loading and unloading tracks	14 weeks
Being switched to and from loading and unloading tracks	6 ‘‘
Awaiting shippers' orders	2 ‘‘
Idle, because of arrival on Sundays and holidays	3 ‘‘
Repairs	5 ‘‘
Stored for lack of tonnage in slack seasons	2 ‘‘
Waiting in yards en route for trains to be made up, etc	5 ‘‘
On interchange tracks where freight is transferred from one railroad to another	9 ‘‘
Actual movement along the main line	6 ‘‘

The average car spends half its time being loaded and unloaded, and another quarter in waiting around after it has started on its journey. If deductions are made for wrecks, washouts, breakdowns, congestion, etc., the normal time that a car actually moves on the main line is reduced to 37 days or one-tenth of the year. These figures help to explain why freight rates are so high. Of course a large part of the delay is inevitable, but there is clearly room for much improvement.

The Problem of Long Hauls versus Short.—It is easily seen that the railway system in America is built to facilitate long rides, long hauls, and large loads, as contrasted with the European system built for short rides, short hauls, and small loads. This condition gives rise to one of the most difficult railroad problems. As a region becomes more thickly populated there is a growing need of short hauls and frequent service. That is what is needed in New England and the densely populated Atlantic seaboard. There a large amount of traffic takes the form of small irregular packages, manufactured goods in boxes, and miscellaneous raw materials which often come in small lots. The West, on the other hand, ships much of its freight in carload lots or train loads of wheat, stock, or other commodities. The same is true of Pennsylvania with its coal and the South with its cotton. A similar contrast is seen in the need for terminal facilities. The West and the ports where raw materials are shipped want terminal facilities where a train load of homogeneous quality can be quickly handled. They want to be able to load or unload cars of grain or ore by merely opening a chute and letting the material pour out. Many of the efforts of American inventors have been directed along this line, so that an entire train load of coal cars or oil cars can be emptied in a few hours by running onto a high track and opening the bottom of the cars. On the other hand the intensive manufacturing industries are calling for an equally fine development of methods of loading irregular boxes and bales. That is why the problem of movable trucks and of overhead cranes as discussed in Chapter VIII is primarily a problem of the eastern United States.

The Railway Problems of Power and Ownership—Another business problem which confronts the railways is the type of fuel and the method of the application of power. Today railroads in the United States are run chiefly with soft coal, but some burn hard coal, some oil, and some are run by electricity. Everyone agrees that the present methods waste power and that it is a pity to use fuels like anthracite and especially oil which are limited in quantity and are likely to be exhausted. Never-the less, the low cost of these commodities at the places where they are produced and their great convenience and cleanliness compared with soft coal cause their use to continue. The use of electric power would be cheaper than any other kind, provided it did not cost so much to change the equipment and adapt it to the new source of power. Electric power on a large scale has been tried in only a few places such as the 75 miles between New York and New Haven and 420 miles on the Chicago, Milwaukee, and Puget Sound R. R. through the Rocky and Cascade Mountains. In California the Southern Pacific went extensively into the problem of using hydroelectric power. It believed that this would be the cheapest method in the long run, but gave up the attempt because of governmental regulations hedging in the use of water power. It seems probable, however, that in course of time one of the important railway developments will be the use of hydroelectric power at least in the mountains and the Pacific states, and of electricity derived from coal burned at large central power plants on the eastern seacoast or at strategic interior positions to which coal can be brought cheaply.

Another railway problem of the United States is created by the demands for nationalization. With the expansion of commerce and with improvements in methods of transportation the railway system of a large country must more and more function as a single unit. Also it is more and more apparent that the railroads are so important that it is not right that they should be in danger of being put out of commission either by strikes or by the incompetency of private owners. On the other hand a great many people believe that the running of railroads by the general government is an extremely inefficient and unprogressive method. Thus far the line along which these two conflicting views have been harmonized has been more and more rigid government control under the Interstate Commerce Commission while the railroads still remain in private hands.

The American Trolley System.—Trolley lines are even more distinctly American than railways. They are the natural result of the growth of large cities and their distribution in the United States is almost like that of the cities. The only important exception is that in the level regions of the Middle West, especially from Ohio to Illinois, interurban trolley lines, which are practically railroads, have been developed more than in the manufacturing regions farther east.

The nature of the transportation system of an ordinary town depends largely on the number of inhabitants. In a small village practically everyone walks to work. In a small city the majority still walk, but there are a few trolley lines and a moderate number of persons use automobiles. In a large city of 100,000 or more inhabitants the trolley system is generally quite well developed, but most of the lines run fairly straight toward the center. In such cities automobiles become an important method of going to work among the people who are well-to-do, and jitney buses are rapidly coming to be an important means of carrying people on routes where the traffic is not heavy enough to warrant the building of permanent tracks. The next stage in the development of the urban railway system is the building of what are often called crosstown lines, or lines which run wholly or partly around the city at a distance from the center. As the city grows still more, the surface lines become too slow and are too much interrupted by the heavy traffic to accommodate the people who live far out. The steam railways help to meet this condition by running local passenger trains and selling commutation tickets at low rates. This, however, often fails to meet the situation and elevated lines are added. The last stage in the evolution of city transportation is the subway. New York, Boston, and Philadelphia are the American cities where subways are important. Although London, Paris, and Berlin also have subway systems none of them can compare with that of New York. The New York system is due not merely to the size of New York but to the peculiar way in which the city is hampered by being on a long narrow island. It requires not only subways north and south but tunnels under the rivers to the neighboring mainland and Long Island.

Among the business problems which confront the trolley lines and other urban carriers one of the most difficult, as we saw in Chapter VIII, is competition with other methods of transportation. Another is the issue of transfers. The European method is to pay a small sum for a short ride and to pay for zone after zone on a long ride. In America, although this system has been tried, it is not common. Most American cities prefer to have a single fare for the entire city and to have a free transfer system. It sometimes seems unfair to pay as much for a ride of half a mile as for one of 15 miles, but this is like the single postal rate on letters to all parts of the country and even to many foreign countries. The flat rate of fare for rides of all lengths is good for a city because it tends to prevent congestion and slums. When a city is divided into small street car zones, the poor people tend to crowd into the quarters around the factories or other places where they work.

Automobiles as the most Distinctive American Mode of Conveyance.—We have already seen that the United States and Canada have far more automobiles in proportion to the population than any other countries in the world. Of the 12,600,000 automobiles in the world in 1921 the United States and Canada had together almost 11,000,000, leaving only 1,600,000 for all the rest of the world. Such a condition is one of the chief reasons why the road problem is one of the most serious that confronts the United States.

It is noteworthy, however, that in proportion to the population automobiles are not most numerous in the parts where the roads are most improved, but in the central plains where the wealth of the farmers and the levelness of the land are favorable conditions, even though the roads are not improved and are very muddy at certain seasons.

The reasons for the great number of automobiles in the United States and Canada may be summed up as follows: (1) Inventiveness. The American countries lead the world in inventions and in the speed with which they adapt new ideas to their uses. (2) Standardization of products. Only in America have automobiles been built on a huge scale with standard parts so that they can be turned out cheaply in enormous quantities. One result of this is that today in America three-fourths of the cars cost less than one thousand dollars. (3) Abundant gasoline. The fact that the United States is by far the world's greatest petroleum producer has had a great deal to do with the growth in the use of cars. So too has the huge size and complicated organization of the Standard Oil Company which makes every effort to provide gasoline wherever it is wanted. (4) Natural wealth. Although the automobile has now been reduced to a price not much greater than that of a horse and wagon, it still is too expensive for ordinary people except in a country where there is abundant wealth. (5) The level interior plains. All forms of transportation are greatly helped by levelness. In the case of

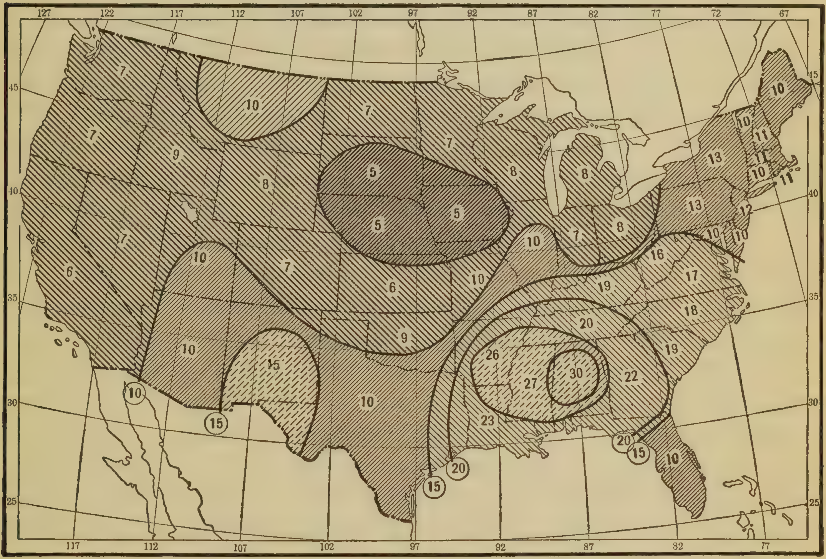


FIG. 92.—Persons per Automobile in the United States, 1921.

the automobile this is not only because it is cheaper to run on a level than up hill, but because good roads are far more expensive in the rugged regions.

The automobile has not only introduced many new transportation problems such as are discussed in Chapter VIII but has brought important new social conditions. Even more than the telephone and rural free delivery system it has brought the farmer into contact with other people. With the further development of good roads the farmer who lives 5 or 10 miles from town and a quarter or a half mile from his nearest neighbor will find it as easy to come in touch with people as did the person who lived in a village a generation ago. The automobile has also changed the recreation system of the United States. It not only enables city people to get into the country, but it permits people to have summer homes in numerous places to which formerly they could not go because of the difficulty of getting supplies. As an offset to these good effects the automobile has made some forms of crime easier and more frequent than formerly. It enables the city miscreant to rob the farmers' orchards, gardens, woods and streams, and it makes it easy for the wrong-doer to escape from the city. The fact that a criminal can escape so quickly in an automobile has been one of the great reasons why robbery and other crimes of violence are more abundant in America now than ever before, and are probably more frequent in the United States than in any other country with a supposedly high standard of civilization.

American Harbors and Ocean Waterways.—We have already seen that a great seaport can grow up only where the population is dense, where there is a productive hinterland, where communication with the hinterland is easy, and where there is room enough for a city and depth and space enough for a large harbor. The way in which the waterborne commerce of the United States is concentrated on the north Atlantic coast shows how important these conditions are. Today some of the greatest problems connected with ocean transportation are (1) the St. Lawrence waterway, (2) the development of better channels and larger terminals, (3) the problem of American versus foreign rates of pay for sailors, and (4) the problem of an American merchant marine and national subsidies. A deep waterway navigable for ocean vessels to Chicago or Duluth is entirely practicable. It requires only that the St. Lawrence, Niagara, and Sault Ste. Marie canals be enlarged. Engineers believe that the St. Lawrence canals, which would be the longest and most expensive, can be made to pay for themselves by developing water power in conjunction with the canals. They also claim that the new supply of power would stimulate manufacturing in

New York, New England, and southern Canada, the uninterrupted waterway would give the farmers of the interior cheaper transportation rates, and both conditions would stimulate the interchange of goods between the farmers and the manufacturers as well as between this country and Europe. Canada would benefit more than the United States, but this does not mean that the United States would suffer. Some business would be diverted from New York, but that might be a distinct advantage for already New York suffers from congestion far more than from lack of business. The one great disadvantage of the St. Lawrence-Great Lakes route is that parts are frozen for three months each winter, and sometimes five.

It is sometimes supposed that if a city can make its harbor deep enough and its terminal facilities sufficiently large and convenient it can assure trade for itself. This is only partly true. A city like Portland, Maine, cannot hope to compete with Boston no matter how deep its harbor or how large its terminal facilities because it lies farther from the great centers of production in manufacturing and agriculture. Nor can Boston hope to compete with New York for the same reason and because the route from Boston to the interior is rugged while that from New York is level. Nevertheless, there is no question that unless a city keeps deepening its harbor and enlarging its terminal facilities in accordance with the growth of industry its commerce will rapidly dwindle.

One of the most serious problems that confronts American transportation is how to make an American merchant marine pay and at the same time maintain American rates of wages. At present the laws of the United States oblige the owners of vessels registered under the American flag to care for their sailors in a much more expensive way than is required by most other countries. Many shipping firms have in the past found this impossible and have preferred foreign registry even though the vessels were owned in America. It is generally agreed to be highly advisable that the United States should own a large number of ships but it is also agreed that it is not profitable to own ships which cannot earn enough to make them pay. At present the laws of the United States foster American shipping and attempt to maintain the American standard among sailors by providing that only ships with American registry shall carry goods from one port of the United States to another. When it comes to transoceanic commerce the problem is more difficult. A large number of the ships which were built during the war were tied up for a year or two during the succeeding period. Subsidies from the national government to ships carrying the United States mails are thought by many people to be the best means of encouraging American shipping. Others think that this method is too expensive, and that it is better to let foreign ships carry American goods. The whole question is one of the most important in connection with America's foreign commerce.

The Internal Waterways of the United States.—On the map it appears as if the Mississippi River leading from the Gulf of Mexico into the heart of the agricultural regions of the United States ought to be a highly important waterway. On the map it likewise appears as if the New York Barge Canal linking America's most active manufacturing region with the Great Lakes near the most productive agricultural region ought to be equally important. In spite of a slight recent revival neither carries commerce of great importance compared with what could be carried, or with what similar waterways carry in Europe. The reason is partly the slowness of transportation by canal or river, partly the fact that the channels in both cases are not deep enough for ocean-going boats, partly the necessity for more trans-shipment than is needed with goods carried all the way to their destination by train, and partly the competition of the railways. New methods may increase the use of the inland waterways, but the development of the automobile and of other transportation facilities has recently lessened the demand for them.

Facilities for Communication in the United States.—*The Post Office and Telegraph.*—In the United States, as in all other advanced countries, the chief facilities for communication are the post office, the ordinary telegraph, wireless, and the telephone. While the postal service of the United States is fairly efficient, it is not equal to those of England and some of the other European countries. Nevertheless the accuracy with which it delivers something like 70 million letters and other pieces of mail each day is marvelous. We hear of the miscarriage of a single letter and forget that for each one that is missent a hundred thousand are delivered correctly and promptly. As an agency for business the post office is of almost incalculable value. When a business firm mails letters it can be practically certain that every one will be delivered even in places so remote that the mails arrive only once a week or once a month.

Another important feature of the post office is the parcels post. Although this was established only in 1913, it today carries an enormous number of packages. In 1921, the American Railway Express shipped about 400 million packages while the post office shipped 2,600 million or about 25 for every man, woman, and child in the United States. So important is this service that some of the largest businesses in the country are mail order houses which rely almost entirely upon the post office to deliver their goods. Through their huge catalogs and the accurate service of the postal authorities the rancher's wife in Montana or the miner's wife in Arizona or Alaska can purchase almost as easily and cheaply as can the woman who lives in the center of one of the greatest cities.

Although the telegraph is an American invention the United States and Canada have never used it so extensively as have many European countries. At present the number of messages sent per year by the Western Union Telegraph Company, which is by far the largest in the United States, amounts to somewhere in the neighborhood of 100 000,000 or more per year. In proportion to the population the one and a half million miles of telegraph wire in the United States and the quarter of a million in Canada give those countries quite as large a telegraph system as those of the countries of Europe. In proportion to area, however, France and Germany each with about half a million miles and Great Britain with a quarter of a million are many times as well equipped as the American countries. Moreover, the European lines are kept busy more steadily than those of the United States. The chief reason why the telegraph is used less in America than in Europe is the telephone.

With the introduction of wireless telegraphy a new set of problems confronts the world. Here, just as in the case of the airplane, the problem is who shall use the air and how. When amateur radio operators by the thousands began to send their messages into the air it became necessary to impose restrictions so that the air should not be loaded down with messages which interfered with one another. The result has been a gradual tendency to assign different wave lengths to different types of messages. Before many years the laws of the air will probably be as closely defined as those of the earth's surface.

The Telephone as an American Product.—The telephone ranks with the automobile as preeminently American. In the United States at the beginning of 1921 there were 13,113,000 telephones or 12.3 for every hundred people, while Canada had 856,000 or 9.8 for every hundred people. The only other countries where the numbers at all approach these figures were New Zealand with 7.5 telephones per hundred people, Sweden, 6.6, Norway, 4.9, and Australia, 4.3. Even in so advanced a country as Belgium there is less than one telephone for every hundred people. In fact, throughout much of Europe, the telephone is a rarity found only in the homes of the rich, in business offices, and in public places.

In the United States the number of telephones is greatest in almost exactly the places where the automobile is most used. This means that the greatest users of both the automobile and the telephone are the prosperous farmers of the Middle West and of the Pacific coast. The seven states ranking highest in automobiles and telephones in proportion to their population in 1921 were as follows:

Automobiles.	Telephones.
1. Iowa	1. Iowa
2. South Dakota	2. Nebraska
3. Nebraska	3. Kansas
4. California	4. California
5. Kansas	5. Illinois
6. Colorado	6. Oregon
7. Oregon	7. Minnesota

One of the interesting features of systems of communication and to a less degree of transportation is the way in which they tend to become concentrated in the hands of a single company. The post office was originally run by individual companies, but one reason for its nationalization was in order to secure uniform service. The express business began with numerous individual local companies, but gradually these have coalesced into a few large companies. During the Great War these were run as a single organization and to a large extent this method still survives. Each individual company has its own territory, but all work as a unit. In the same way the telegraph business is largely in the hands of the Western Union while the only other large company, the Postal Telegraph, works in cooperation with its larger rival.

In the telephone business even more than the others the presence of more than one company makes a great deal of trouble. The great advantage of a telephone is that it puts everyone in the closest and easiest communication with other people no matter where they may live. Where two telephone companies are in operation, as frequently happened in the old days, there is a steady demand that the companies be united. Hence most of the smaller companies have disappeared. While the telephone companies of different parts of the United States go under different names, most of the large ones are subsidiaries of the American Telephone and Telegraph Company, the Bell System as it is called. Nevertheless in 1917, 53,000 other telephone systems were in existence, a large part of which were purely local lines owned by farmers. The great Bell System with 225,000 employees and a capital of $2,000,000,000 is distinguished by having more stockholders than any other company in the world, 186,000 in 1921, of whom nearly 26,000 were employees. The number of telephone calls is about 35 million per day or 12 billion per year. In order to supply all the telephones about 27 million miles of wire are needed or nearly 20 times as much as for all the telegraph lines. Judged by the number of employees and by the expenses and capital the telephone system of communication in the United States is four or five times as important as the telegraph system.

It is hard to realize that conveniences so universal as the telephone, telegraph, parcels post, post office, automobile, trolley car, railway, and steamship were all unknown not much more than a hundred years ago, while no longer ago than 1900 the automobile, wireless, airplane, and the parcels post system were practically unknown in the United States.

EXERCISES AND PROBLEMS

1. Compare the transportation and communication facilities of the United States with those of other countries. In Tables 33 and 34 decide in which columns a high figure and in which a low figure is most desirable. Make a table showing the following for each column, omitting those that are not really significant as an indication of the degree of relative progress.

I	II	III	IV	V
Figure for U. S.	Foreign country most like U. S.	Name and figure for highest country in list.	Name and figure for second highest country.	Name and figure for lowest country in list.

Use this as a basis for a written discussion of the relative rank of the United States in transportation and communication and of its position compared with the parts of the world that stand lowest or highest. Give reasons for the position of the various countries in your table.

2. Use the directions of Exercise 1 for a relative study of the transportation and communication systems of the United States as given in Tables 35, 36, and 37. In the table and elsewhere substitute your own state for the United States, and other states for foreign countries.

3. Let each member of the class make a map of some column of Table 33 or 34, using either symbols for value, or isopleths and shading. Compare the various maps and try to interpret them. Explain why the countries that are high in 33 B or 33 E are not necessarily high in 33 C or 33 F. What does your map show as to the United States compared with other regions?

4. Repeat Exercise 3, substituting states for countries, your own state for the United States, and using Tables 35, 36, and 37. In what maps does the influences of the following factors appear most clearly and why; (*a*) cities, (*b*) relief, (*c*) general prosperity, (*d*) agriculture?

5. Choose an advanced and a backward country and discuss their systems of transportation and communication as fully as possible on the basis of Tables 33 and 34 and of good maps.

6. Repeat Exercise 5, using states instead of countries.

7. A commercial journal published in Massachusetts says that the St. Lawrence River Canal "is one of the most preposterous issues ever put before the country." It objects to it on the following grounds:

1. It is a sectional program and the ports of Boston, Philadelphia, Baltimore, and New York would be "side-tracked" by ocean-going vessels from Duluth or Chicago. (What evidence of this possibility would you require to convince you? If possible obtain data of shipments from any one of the Atlantic ports. What per cent comes from the Middle West?)

2. Navigation is closed for five months on the St. Lawrence because of ice. Is this true? (What other rivers of the world which might be used for navigation are thus handicapped? Are any of the Atlantic Coast harbors ever closed by ice? Are the navigable rivers of the United States frozen over during the winter? See U. S. Weather Bureau bulletins on Snow and Ice.)

3. While the engineering feat is not impossible, it will be costly. (What is the draft of ocean-going vessels? of Lake vessels, assuming that wharfage depth is just sufficient? How much deepening would be necessary for the Lakes terminals? What differences are there between lake boats and ocean steamers?

4. Under existing laws it would injure rather than help our shipping. (What are the problems of a merchant marine? What is a ship subsidy? How would our laws help English shipping in the proposed St. Lawrence waterway and hinder ours? Watch the action and discussion of Congress on this point.)

8. In your own neighborhood estimate the various kinds of transportation. Classify under the following headings the various methods of transportation in use in your community, county, or state: (*A*) ways, (*B*) vehicles, (*C*) terminals. In which of these methods is the terminal an important element? The Mississippi River traffic is said to be lacking in proper terminals. What is the nature of the present terminals? Why were they sufficient once, and inadequate today? Obtain an account of the Bush Terminal, New York, and compare its facilities with those of the Mississippi River, or any other river which appeals to you.

CHAPTER XXVIII

THE BUSINESS OF RECREATION

The Growing Importance of Recreation.—Recreation is rapidly giving rise to some of the chief kinds of business. People not only entertain their friends and go to movies, theaters, concerts, and parties, but engage in out-of door sports and recreations and travel widely to visit the marvelous scenery which is so widespread in the United States and elsewhere. In advanced countries it is no longer necessary to make excuses for time spent among the hills, on the water, at the bat, or in the saddle. The Saturday half holiday is now extremely common. The war helped to convince Americans that sport generally means health and strength and thus improves the moral fiber of the people and increases their mental power. If the sports and recreation of a nation are a barometer of its progress, it is a good sign that two of America's chief contributions have been baseball and the city playground.

It is as yet impossible to form even an approximate estimate of the amount spent in the development, direction, and enjoyment of sports, holidays, vacations, and amusements. The total, however, certainly runs well into billions each year. The moving-picture industry is now said to be fourth in importance in the United States. Many stores have sport departments, a large share of our magazines and books are pubsished solely to furnish recreation, and many are devoted to special forms of amusement. Phonographs and other musical instruments are sold by the million, while enormous sums are spent on museums, parks, pageants, expositions, and conventions where recreation is one of the main objects.

Kinds of Outdoor Recreation and Their Geographical Distribution.—The chief outdoor games, sports, and recreations of the United States fall largely in the following groups:

A. Baseball, Football, Golf, and Tennis.
B. Snow-shoeing, Skating, Skiing, and Coasting.
C. Hunting and Fishing.
D. Nature Study and Photography.
E. Walking, Riding, Bicycling, and Motoring.
F. Boating, Canoeing, and Yachting.
G. Racing and Athletic Contests.

A. Baseball, Football, Golf, and Tennis.—Baseball arouses more popular interest than any other outdoor American sport. More than any other it is also the sport of cities and towns. On the whole it is much more active in the northeastern quarter of the country than in any other part. In order to be most successful it needs not only eighteen players, but enough onlookers to arouse enthusiasm. Although the reports of prices paid for players in the major leagues are usually exaggerated, the expenses of maintaining this sport are great. For example, the New York Americans, one of the most expensive clubs in the country, is said to cost $600,000 a year for maintenance. Since there are sixteen major baseball clubs and numerous small ones, as well as thousands of amateur baseball teams connected with educational institutions, factories, churches, clubs, and other organizations, the total amount of money spent on the sport and the number of people who take part in it both rise to large proportions. In 1921, the attendance at the games of each of the major New York clubs amounted to over a million, while the numbers were 900,000 in Cleveland, and 500,000 in Philadelphia. The World's Series at the end of the season netted a little over $900,000 for the eight games and approximately 270,000 people attended.

Football is preeminently a game of educational institutions. There its receipts are often depended on to make up the deficit incurred in other sports. Crowds of 10,000 are common and those of 60,000 to 80,000 are sometimes reported. Football has probably been responsible for the building of more unique structures than any other game. The great Bowl at Yale, the Stadium at Harvard, and similar structures at many other colleges are a distinct feature of American architecture. Football is so strenuous a game that it is not adapted to southern climates or to the warm weather in any climate.

Golf and tennis differ from baseball and football in being not only possible but pleasant and profitable when only two, or in the case of golf, only one player is present. Moreover, they are played almost entirely for the fun of the game and for exercise and recreation rather than as something to be watched by spectators. To a considerable degree they are sports of the well-to-do, for compared with the number of players, it is far more expensive to maintain a tennis court and especially a golf course than a field for baseball or football. They are likewise the sports of the suburbs of cities. Near Philadelphia, for example, there are between thirty and forty golf courses. Golf and tennis as well as baseball and football are very common in the northeastern quarter of the United States, but in proportion to the population they are especially well developed on the Pacific coast, where the climate of California is particularly well adapted to outdoor sports at all seasons. It might be supposed that the mild winter climate of the South would favor these sports, but as a matter of fact most sports are relatively much more highly developed in northern than southern communities.

B. Snow-shoeing, Skating, Skiing, and Coasting.—These are old sports, some of which show an interesting new development. Under natural conditions they are of course possible only in the north and even there only in cold weather. So popular and so healthful are they, however, that in recent decades not only have they become the great attraction of many winter resorts in places like the Adirondacks, the White Mountains, and the province of Quebec, but artificial skating rinks and toboggan slides are sometimes maintained in cities; and people pay liberally in order that the skating season, for example, may be prolonged. These winter sports are at their best in glaciated regions like New England, northern Wisconsin and Minnesota, and eastern Canada, for there not only are lakes numerous but the topography is usually rugged enough to provide slopes for coasting and skiing.

C. Hunting and Fishing.—Closely connected with the winter sports are those of hunting and fishing. Among sparsely settled mountains and in the glaciated parts of the country from New England to Michigan and in the great northern forests of Canada they are especially important as a source of income for guides, hotel-keepers, and others. In 1921, even such a populous and largely level state as New Jersey issued 146,000 licenses for hunting and fishing to residents and over 7000 to non-residents. In Michigan, 55,000 fishing licenses were issued to non-residents, while in California 145,000 fishing licenses were issued in 1919, and 220,000 hunting licenses in 1920. It is claimed that in that state in 1920, the hunters and anglers alone spent about $20,000,000 in the pursuit of fish and game. In New England, Florida, and California salt-water fishing is an important sport as well as a business.

D. Nature Study and Photography.—A large number of people hunt and fish, not because they have any particular love of killing, but because they want some incentive to take them out into the woods and hills. In the last generation or two there has been a great growth in other incentives to active outdoor exercise. With some people this takes the form of botanizing. They find infinite delight in collecting as many kinds of flowers as possible, and especially in finding rare varieties, early blossoms, or plants that grow in unusual surroundings. To others an equal source of pleasure is found in the study of insects, animals, and especially the varied and fascinating birds. Not only is the beauty of the birds a great attraction, but their numbers, their almost constant presence and yet their elusiveness, and the delight of hearing their songs, finding their nests, and watching their young, make "birding" one of the most delightful recreations. Formerly people thought that they had to kill the animals and pick the flowers in order to enjoy them. Today, we are learning that studying the habits of living creatures and engaging in the art of photographing them gives far greater satisfaction than mere killing. Moreover, it often takes far more skill to get a photograph of a wild animal, or of a bird on the nest than to collect a skin or some eggs. A photograph of a beautiful bit of vegetation needs most careful study if one is to get it from the right angle and with the right light.

The business aspect of all these pursuits is important. For example, the National Forests, National Parks, and National Monuments, with their millions of acres, are as useful for recreation as for lumber. The advisability of having certain places where plants and animals can live absolutely undisturbed and where everyone can observe their habits without interference from lumbermen, trappers, forest fire, or other outside agencies has led the Ecological Society of America to carry on an active campaign to secure the preservation of certain specially guarded tracts in each state in their primitive condition. This widespread use of the land for recreation is in itself an important element in business, as is the demand for cameras, films, camp equipment, and proper clothing for the woods.

E. Walking, Riding, Bicycling, and Motoring.—Many people who do not actively seek nature by hunting, fishing, nature study, photography, or camping, are eager to get out into the open air. Among all the ways of doing this none surpasses walking, both in healthfulness and in ultimate pleasure when once one really learns how to do it. Many people, however, prefer the greater speed of riding horseback, and the thrill that comes from contact with a spirited animal. A far larger number would enjoy the delightful sport of horseback riding if it were less expensive. At one time bicycle riding bade fair to become a great sport, but it has received a serious set back because the automobile makes the roads unpleasant for the bicyclist, and bicycling is not nearly so sociable as automobiling. Although the automobile is probably used chiefly for business in the more restricted sense, it also plays an enormous and growing part in recreation. When a thousand cars an hour pass a given point on the way to the seashore or mountains on a Sunday afternoon, and when this happens in scores or hundreds of places, it means that vast numbers of people are using their cars for recreation. Few things show the attraction of good scenery so strongly as does the way in which automobiles flock to the most beautiful parts of the mountains, lake regions, and seacoasts. But fortunately motoring is an enjoyable recreation wherever the roads are reasonably good even though the scenery is not remarkable. Probably no form of recreation except the movies has grown more rapidly in recent years.

F. Bathing, Swimming, Boating, Canoeing, and Yachting.—The water exerts a great attraction upon mankind not only because of its beauty, but because it usually makes the air cool and invigorating in hot weather. Hence any form of recreation that takes people into the water or out upon it is peculiarly desirable. All the water sports are healthful, but those which require active exercise are especially so. Swimming is said to exercise the body more fully and beneficially than almost any other form of exercise. The fascination of the water sports, joined with the beauty of the scenery and the healthfulness of the air have a deep effect upon the value of land. On almost every coast, provided it has the least claim to beauty, the value of the coastal strip is much greater than that of the land even a few hundred yards back. In regions like New England, these values rise to such an extent that there are places where the land bordering the shore has a value of perhaps $20,000 per acre, while similar land no more than half a mile away may be worth only a few hundred, that is, the price of good farmland with an assured summer market.

G. Racing and Athletic Contests.—Racing of all kinds on land and water, with horses, automobiles, bicycles, canoes, shells, yachts, iceboats, and airplanes, or on foot, or with skates, skis or snowshoes, is like golf and tennis in being the sport of a comparatively few. Yet when all forms of racing and of other individual contests like jumping and putting the shot are taken together, they play quite a part in the life and business of the country.

The Increasing Use of Summer and Winter Resorts.—A considerable percentage of the people of the United States take a vacation each summer and a smaller number take vacations in winter. Some spend the vacation at home and enjoy local sports, gardening, walking, or simply resting, but a great number go away to places especially adapted to vacations. Any geographical condition which causes a region to have unusually good air, good scenery, or facilities for sport and recreation may cause it to become a resort. The most frequented resorts are probably those of the Atlantic coast from New Jersey to Maine. Along some parts of the shore, such as the coast of Connecticut, summer houses form an almost continuous line for mile after mile, and are often several rows deep parallel to the beach. Some of the most famous winter resorts are on the coasts of Florida and southern California. It is claimed that about 750,000 people visit Florida each year, and spend about $300,000,000. Such figures are mere estimates, but there is no doubt as to the magnitude of the tourist business. Among inland resorts the rugged parts of New England and New York, especially the White Mountains and Adirondacks, take the lead, partly because glaciation has added to their rough beauty by creating many small lakes, but also because they lie near the most densely populated parts of the country. Similar but less rugged glaciated country in northern Michigan, Wisconsin, Minnesota, and Canada, provides many attractive but less frequented resorts. So, too, do the Southern Appalachians, but there the variety of scenery is less because of the absence of glaciation, and the climate is especially adapted to winter resorts such as Asheville, North Carolina, and Hot Springs, Virginia. The grandest scenery of the United States is found in the Rockies and among the mountains of the Pacific coast. Those regions attract more people every year. Colorado claims that in 1921 about 275,000 people spent their summer vacations there. Canadian customs officials say that judging by the number of automobiles entering Canada from "the States," the foreign motorists spent $100,000,000 in Canada in 1921.

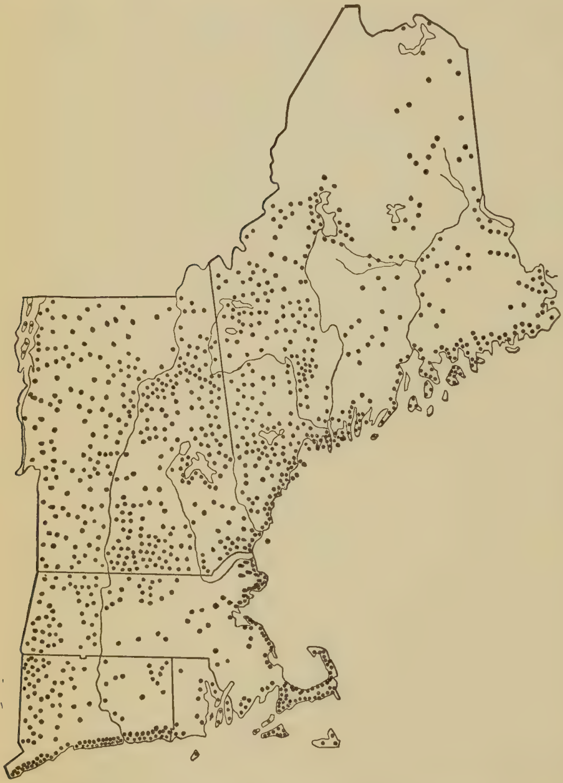


Fig. 93.—Summer Resorts in New England.

Each dot represents a place that can accommodate at least 50 persons. Of course many of these can accommodate many times 50.

The policy of the government in setting aside national parks and forests all over the country greatly adds to the possibilities of pleasant and inexpensive vacations away from the cities in the heart of the woods and mountains, and among the loveliest of lakes and rivers. The total area of the parks and forests is now three times that of New England,

and they are located in 22 states and territories. In practically all of these anyone who will obey the regulations can camp or erect some kind of a shelter almost without expense. In California during 1921 nearly 40,000 people camped in the open in the Yosemite National Park alone.

The Playgrounds and Parks of Cities.—For the city children who cannot get away in summer new opportunities for play are being provided each year. In 1900 there were public playgrounds in nine cities, in 1906 the number had increased to 35, in 1917 to 653, and now practically every city has some kind of playground, and thousands of people are engaged in directing the play. The following table shows how some of the big cities rank in respect to public parks, which are the larger playgrounds of the cities.

COMPARATIVE PARK STATISTICS, 1916

	Estimated Population.		Park Area.		Persons per Acre.		Expenditures.		Expenditure per Capita.		Value Thousands of Dollars.	Value per Capita.	
	No. of People.	Rank.	Acres.	Rank.	Number.	Rank.	Dollars.	Rank.	Dollars.	Rank.		Dollars.	Rank.
New York..	5,468,190	1	7740	1	706	9	6,148,144	1	1.12	6–7	649,220	119	1
Chicago....	2,447,845	2	3870	3	632	7	3,879,734	2	1.58	2	56,695	23	6
Philadelphia	1,683,664	3	5500	2	306	4	2,446,201	3	1.45	3	30,613	18	7
St. Louis...	749,183	4	2476	5	302	3	848,940	5	1.13	5	13,597	18	8
Boston ...	746,084	5	3640	4	205	1	1,667,466	4	2.23	1	69,209	93	2
Cleveland.	657,311	6	1702	7	386	5	530,832	9	0.81	9	28,972	44	4
Baltimore.	584,605	7	2278	6	257	2	637,710	7	1.09	8	7,233	12	9
Pittsburgh..	571,984	8	1417	8	404	6	703,617	6	1.23	4	18,189	32	5
Detroit .	563,250	9	885	9	637	8	632,354	8	1.12	6–7	29,312	52	3

The Indoor Types of Recreation.—*The Movies.*—Indoor recreations are as important as outdoor recreations if measured by the amount of money spent on them or by the number of people who enjoy them. Measured by the extent to which they promote health, happiness, and good conduct, their value is less. Nevertheless, they are a necessary and essential part of modern life. While indoor athletic contests, theaters, dances, concerts, lectures, and many other types of amusement and recreation belong to the indoor group, the movies are the most important from the business point of view. In the United States they are probably the most universal of all recreations, for they are not limited by climate or season, and can be enjoyed anywhere at all seasons. Their distribution is almost the same as that of the population except that where the people are prosperous there also the moving-picture theaters prosper.

In the production of moving pictures the investment in 1920 was estimated at from $250,000,000 to $500,000,000, while the expenditures were $200,000,000 per year. Of this sum about $50,000,000 was paid in salaries to some 20,000 people, so that the average salary reached the high figure of $2500. Of course the bulk of this went to the "stars" some of whom have refused offers of a million dollars a year, preferring to run their own companies and make their own profits. An average movie feature of five to seven reels costs from $100,000 to $250,000, but sometimes the cost runs up to half a million or even a million. The production of films, unlike their exhibition, depends very closely on geographical surroundings. It is essential that the pictures be produced in places where good weather for photography can be counted on much of the time. It is also essential that there be as great a variety of scenery as possible, including cities, farms, plains, mountains, ocean, rivers, waterfalls, and forests. Los Angeles answers these requisites better than almost any other place in the world, and hence has become the greatest center of production.

After the films have been produced they are exhibited in theaters which number about 10 for each theater of the old type where actors actually play their parts. In 1921, it is estimated that there were 18,000 movie theaters, that they were attended each day by about 20,000,000 people, who paid about $4,000,000 per day in admission fees. These figures may be exaggerated, but it seems fairly certain that moving-picture theaters take in well over a billion dollars a year and perhaps nearly a billion and a half. This is more than the entire interest-bearing debt of the United States in 1900 ($1,023,000,000) or about as much as the first Liberty Loan, $1,466,000,000, the raising of which was considered a noteworthy feat early in the Great War. If to these vast sums there be added the amounts spent for other forms of indoor recreation, for athletics, and for vacations, it is evident that the business of recreation is one of the largest in the United States.

PROBLEMS AND EXERCISES

1. Make a list of the forms of outdoor and indoor recreation mentioned in this chapter and practiced actively within ten miles of your home. Prepare a sketch map of your own locality showing the general region where each type of recreation is practiced. Describe the distribution of the types.

2. Obtain figures showing the area, expense, and other conditions of the parks and playgrounds of your city or of some neighboring large city. Prepare a sketch map showing the location of the chief public and private areas devoted to recreation within two or three miles of your home.

3. Take a recreational census of two selected streets or districts in your city. Classify the business establishments as follows: (*A*) devoted wholly or mainly to recreation or to dealing in goods used primarily for recreation; (*B*) devoted partly to recreation or to recreational goods; (*C*) having no connection with recreation. Draw conclusions as to the importance and nature of the business of recreation in the two areas.

4. Plan a six months' journey in such a way that you may enjoy as many outdoor recreations as possible in areas where the recreations are unusually well developed and at a season when they are in full swing. Do not stay longer than two weeks in any one place.

5. On the basis of the facts given in this chapter and such others as you can find, prepare a recreation map of the United States. Shade as follows: (1) areas where recreation is the main business, and where great numbers of people go for that purpose; (2) areas where recreation is of moderate importance and there are a fair number of visitors for recreational purposes; (3) areas where people rarely go for purposes of recreation. Discuss the relation of your own region to the general regions shown on your map.

6. Write an account of the distribution and character of the types of recreation which give rise to the dots in Fig. 93. On outline maps of New England or of some other group of states, shade in different colors the following types of resorts or areas where the following sports or recreations are important: (*A*) seashore resorts, (*B*) mountain resorts, (*C*) farm resorts where people go merely to "be in the country," (*D*) swimming and bathing, (*E*) hunting, (*F*) fishing, (*G*) winter sports, (*H*) motoring, (*I*) golfing, (*J*) movies.

CHAPTER XXIX

THE INTERNATIONAL BUSINESS OF THE UNITED STATES

The Importance of Europe in the Foreign Trade of the United States.—One of the most marked characteristics of the foreign trade of the United States is the extent to which it depends upon Europe. Previous to the Great War about two-thirds of the exports from this country went to Europe (Fig. 94), or twice as much as to all the rest of the world combined, and half our imports came from Europe. All parts of Europe by no means shared equally in the trade of the United States, for the little group of countries bordering the North Sea took seven-eighths of our exports to that continent, and supplied far the larger part of our European imports. About two hundred million people in Britain, France, Germany, and their small neighbors were more important in the foreign trade of the United States than were the entire thirteen hundred million of the rest of the world. This fact goes far toward explaining the frequent complaints that the American business man does not satisfy the preferences of his non-European customers in South America and Asia, for example. Every business man makes the greatest effort to satisfy his best customers, and hitherto Europe has been far and away our best customer.

The Kind of Trade Carried on by the United States.—The United States Department of Commerce divides articles of foreign trade into (*A*) crude foodstuffs including food animals, (*B*) foodstuffs partly or wholly manufactured, (*C*) crude raw materials for use in manufacturing, (*D*) partly manufactured materials for further use in manufacturing, and (*E*) manufactured goods ready for the consumer. Fig. 94 shows that previous to the Great War the most important goods that we sent to Europe were crude raw materials for use in manufacturing, especially cotton. We sent Europe twice as great a value of this sort of goods as Europe sent us. The same was true of crude food materials such as wheat and meat, while of more or less manufactured foodstuffs such as flour, canned meat, and lard, we sent the Europeans three times as much as they sent us. On the contrary the two continents exchanged partly manufactured goods to about equal values, while Europe sent us vast quantities of manufactured goods ready for the consumer, the

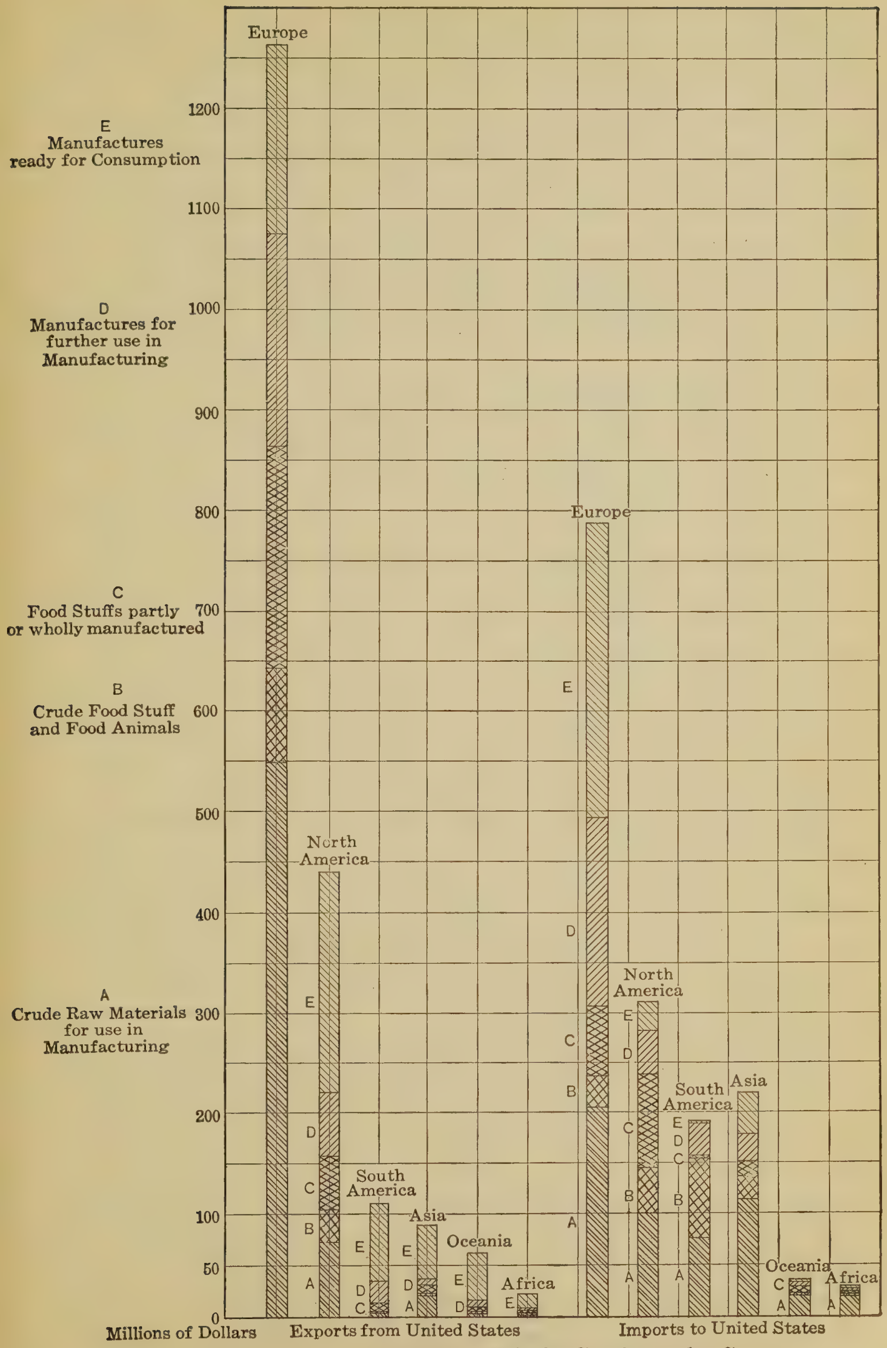


FIG. 94.—Trade of the United States with the Continents by Great Groups of Commodities, 1909–1913.

value of Europe's cloth and other such products being twice as great as the value of the shoes, typewriters, harvesting machinery, and other manufactured goods, which we sent in return.

On the other hand manufactured goods were our main exports to the other parts of the world, while partly manufactured goods were also highly important. The greatest items which we imported from those parts of the world were crude raw materials and foodstuffs, which form nearly two-thirds of the total. The contrast between our trade with Europe and with the rest of the world is summed up in the following approximate annual averages for 1909 to 1913 expressed in millions of dollars:

(1) Exports of raw materials and food, to Europe	862	to other regions	207
(2) Imports of partly or wholly manufactured goods, from Europe	479	from other regions	172
(3) Exports of partly or wholly manufactured goods, to Europe	404	to other regions	506
(4) Imports of raw materials and food, from Europe	308	from other regions	615

The way in which the figures for Europe grow smaller from (1) to (4) while those for the rest of the world grow larger indicates that up to the Great War the United States was a relatively undeveloped country compared with Europe. It was a source of food and raw materials for that continent and a market for its manufactured goods. On the other hand, for the rest of the world, the United States was a relatively highly developed country, which served them as a source of manufactures and as a market for raw materials and food.

How the Trade of the United States with the Continents has Changed.—The conditions which have just been outlined for the period before the war still prevail to a considerable extent, but important changes are in progress. These are illustrated in Figs. 95 and 96 which show the percentages of the total imports and exports of the United States which were derived from or sent to each of the continents from 1870 to 1921. It should be clearly understood that the total volume of trade with each of the continents is now larger than at any previous time. In the diagrams a general fall of any of the lines does not necessarily mean that the total trade has fallen off, but merely that a given continent's percentage of a constantly increasing total has diminished.

From 1870 to the Great War the share of Europe in the imports of the United States, as reckoned in percentages of the total, was declining a little. The war of course caused a rapid decline, for Europe could not supply as much as usual for export to the United States or any other country. Now, however, our imports from Europe appear to be rapidly returning, not to their level before the war, but to the approximate level that they would have reached if there had been no war. In fact, one of the most noteworthy features of Figs. 95 and 96 is their indication that the war merely interrupted, but did not destroy, certain strong tendencies which already existed.

One of those tendencies was toward a decline in the relative importance of Europe in the foreign trade of the United States, even though Europe is still by far the most important factor. Another was toward a marked increase in the importance of the neighboring countries of North America, an increase which has been accentuated by the political change in Cuba after the Spanish War, by the discovery of oil in Mexico, and by the growing prosperity and buying power of Canada.

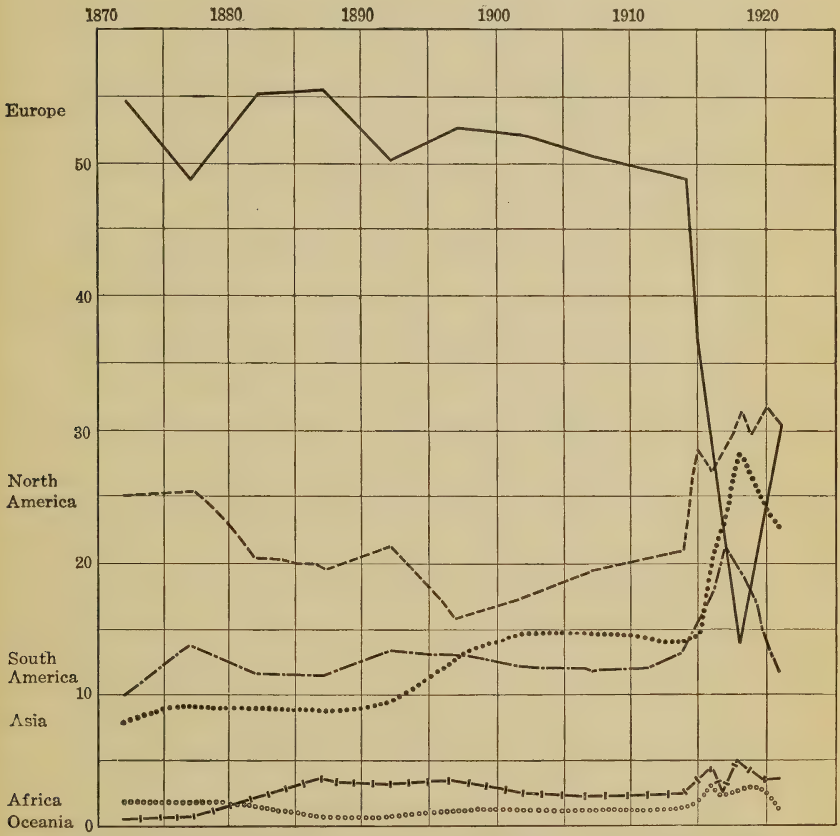


FIG. 95.—Share of the Continents in the Imports of the United States.

Percentages of Total Imports into the United States, 1870 to 1921. 5-year averages, 1870–1914, and yearly data after 1914.

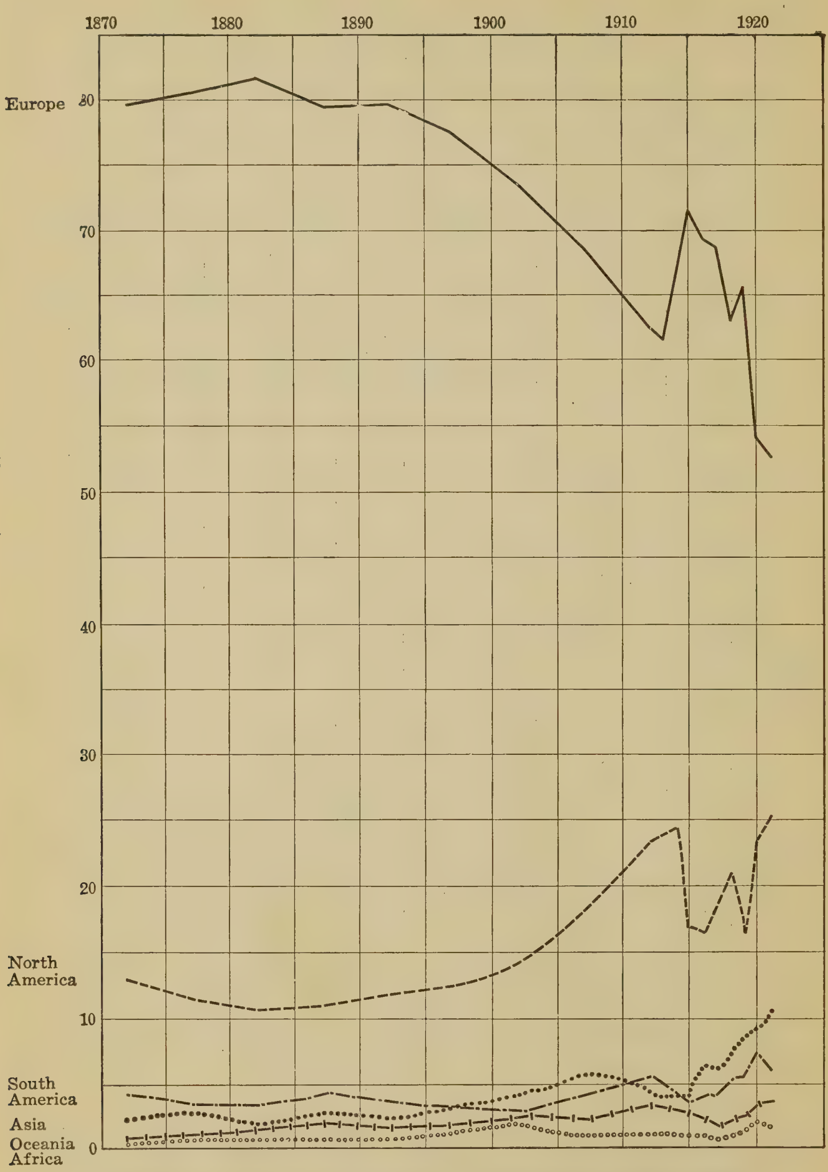


FIG. 96.—Share of the Continents in the Exports of the United States.

Percentages of total exports from the United States, 1870 to 1921. 5-year averages 1870–1914, and yearly data after 1914.

A third strong tendency is toward a persistent increase in the relative importance of Asia and Oceania contrasted with an equally persistent decrease in the importance of the two tropical continents, South America and Africa. In spite of all the efforts to increase our trade with South America, the percentage of imports from that continent has remained almost stationary for half a century, while the percentages of Asia and Oceania have steadily risen. In 1870 South America was more important to the United States than Asia; today Asia has forged far ahead. South America produces either articles like wheat and meat which the United States also produces in sufficient quantities for export, or else tropical products from the equatorial regions where it is hard to stimulate the people to produce much. Africa suffers under a similar handicap, whereas Australia is inhabited by extremely alert, active people. The Asiatics are less alert than the Australians, but surpass the typically tropical people in their capacity for production, are more capable and are also enormously more numerous.

The relative changes in the various continents are in part the result of the increasing manufacturing of the United States. This country needs raw materials which are not available in the manufacturing countries of Europe, but can be obtained from North America and Asia, and to a less degree from South America and Africa. This country wishes to sell manufactured goods, but the market for such goods in Europe is already well supplied and does not expand as in the other parts of the world. The market for manufactured goods is not expanding rapidly in tropical countries, while in the non-European temperate regions such as China it is capable of great expansion. If present tendencies should continue, it is not impossible that before many decades the business of the United States with North America and Asia may be as important as with Europe.

The Relative Commercial Importance of Various Countries to the United States in Proportion to Their Population.—In comparing the commerce of various countries the differences in size make it very difficult to determine which countries are really the more active. For example, the total commerce of Norway and Mexico in 1913 was almost the same, about $250,000,000 for exports and imports together. But since Norway has only a sixth as many people as Mexico, the per capita trade was about $103 for Norway and $16 for Mexico. In other words, the relative importance of each individual in Norway, so far as foreign trade was concerned, was over six times as great as in Mexico. So far as trade with the United States is concerned, however, the average Mexican was more important than the average Norwegian, the figures being $7.60 per Norwegian and $10.62 per Mexican. These figures

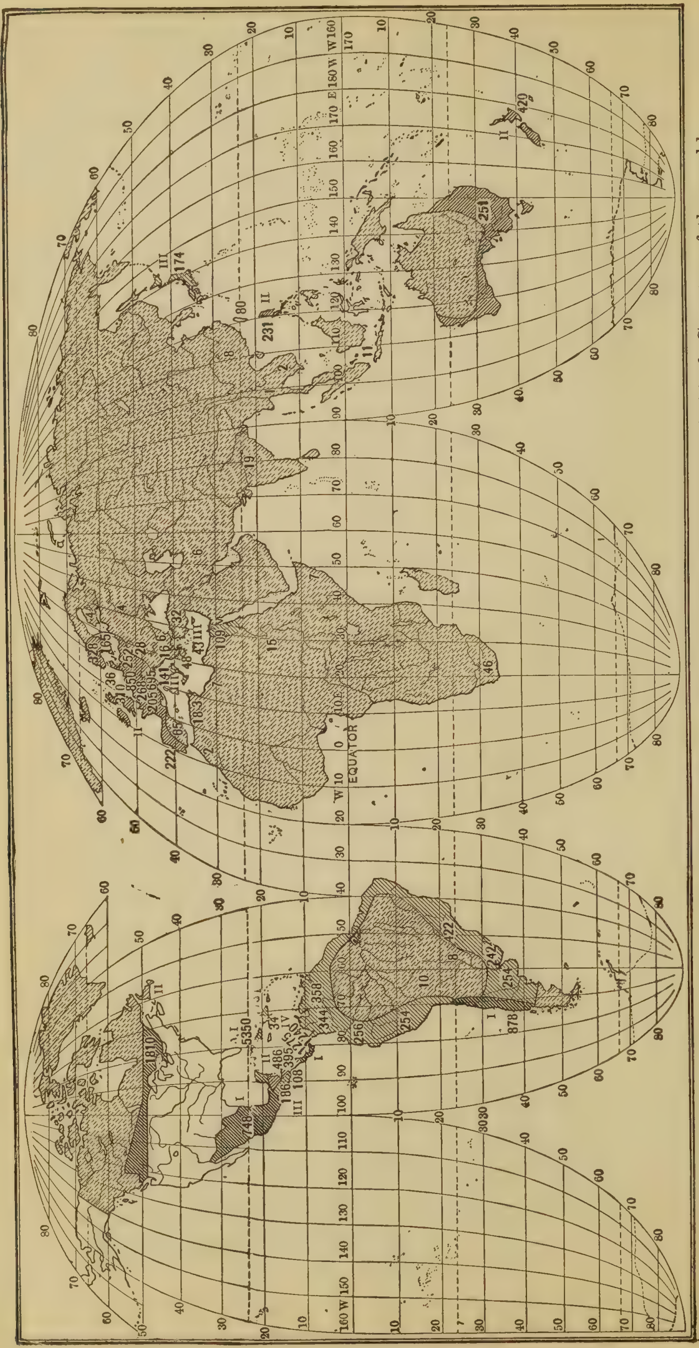


FIG. 97.—Value of the Trade of the United States with an Average Inhabitant in Each Country of the world.

represent the average amount of goods imported to the United States plus the average amount exported from the United States for each Norwegian and each Mexican. The table on page 410 shows similar figures for all the main countries.

Reasons Why Some Countries Rank High and Others Low in the Per Capita Amount of Their Trade with the United States.—The position of the various countries in this table depends largely on the principles discussed in Chapter VII on The Geographic Basis of Exchange. For instance, Cuba and Canada stand at the top of the list not only among North American countries, but among all countries. This is partly because both countries are at our very doors. In the case of Cuba the difference between its climate and ours enables it to raise a large surplus of tobacco and especially sugar, two products which we do not find it profitable to raise in sufficient quantities ourselves. In Canada, aside from furs, there is almost nothing which the Canadian climate favors and which is not favored by our own, but the activity of the Canadian people is equally important as a cause of trade. Their race, their climate, their stage of development, and their standards of living all cause them to engage actively in business. Both Cuba and Canada also owe part of their trade with the United States to governmental conditions, Canada because its government is so good, and Cuba because to a certain extent it is under American protection. Finally Canada's intercourse with the United States is greatly stimulated by the common language and by the close similarity of the habits and customs in the two countries. In Cuba, on the other hand, the difference of language and customs is a handicap, although the number of Americans who know Spanish is rapidly increasing and both that country and our own are learning more of each other's likes and dislikes. The really surprising feature is not that Cuba and the United States have so large a trade, for we want Cuba's sugar and tobacco, and Cuba wants our manufactured goods; but that the trade of the United States and Canada should be so large when the products of the two are so similar, even though the United States is more advanced in manufacturing than Canada. The trade of the two countries illustrates the fact that if people are active and have high standards of living, and are alike in language and customs, they will carry on a brisk trade. In such cases very slight differences in the qualities of goods are sufficient to stimulate business. The same effect is produced when neighboring parts of two countries have different occupations. For example, the people of Ontario ship farm products to the manufacturing cities like Detroit and Cleveland, and buy machinery in return.

Panama's high position in trade per capita with the United States

INTENSITY OF FOREIGN COMMERCE BETWEEN THE UNITED STATES AND OTHER COUNTRIES, 1913

(Trade with the United States per person in each country)

(Arranged in order of *total* trade, Exports plus Imports, per person with the United States)

	Imports from United States.	Exports to United States.
NORTH AMERICA AND THE WEST INDIES		
(2) Cuba	$28.00	$59.20
(1) Canada	42.20	24.90
(3) Panama	16.06	5.21
(4) Costa Rica	9.78	10.97
(5) Jamaica	7.48	7.84
(6) Santo Domingo	7.95	7.74
(7) Honduras	9.40	5.27
(9) Mexico	2.89	6.40
(8) Nicaragua	4.27	4.03
(11) Guatemala	2.40	1.85
(10) Salvador	1.65	2.17
(12) Haiti	2.60	.33
ASIA AND THE EAST INDIES		
(3) Philippines	$2.79	$2.84
(5) Japan	1.21	1.64
(1) Formosa	.11	.78
(2) Turkey	.25	.31
(8) India	.05	.23
(4) Dutch East Indies	.10	.14
(11) China	.16	.08
(10) Chosen	.20	.03
(6) Persia	.01	.09
(7) Siam	.09	.01
(9) French Indo-China	.01	....
AFRICA		
(1) South Africa	$3.90	$0.37
(4) Egypt	.23	1.08
(3) Tunis	.72	.03
(2) Algeria	.45	.14
(9) British East Africa	.22	.11
(7) Libia (Italian)	.25	.07
Portuguese Colonies	.30	.02
French Colonies (not elsewhere included)	.19	.05
(8) Sudan	.01	.15
Former German Colonies	.05	.04
(5) Eritria	.02	.04
(6) Morocco	.02	.02
(10) Liberia	.02	....
(11) Belgian Congo	....	....

	Imports from United States.	Exports to United States.
SOUTH AMERICA		
(5) Chile	$5.77	$8.81
(2) Uruguay	3.40	7.81
(1) Argentina	4.55	5.30
(4) British Guiana	5.87	1.28
(9) Venezuela	2.19	3.40
(10) Colombia	1.50	3.73
(8) Brazil	1.23	3.81
(7) Ecuador	1.89	2.56
(11) Peru	1.32	2.56
(6) Bolivia	.75	.10
(12) Paraguay	.52	.01
(3) Dutch Colonies	.10	.13
EUROPE		
(1) Netherlands	$28.60	$8.49
(4) Britain	13.90	3.07
(2) Belgium	10.70	2.60
(3) Switzerland	5.92	6.89
(8) Germany	5.98	2.49
(5) Denmark	7.58	.84
(9) France	5.43	2.60
(6) Norway	4.26	3.26
(7) Sweden	3.64	1.64
(12) Italy	2.98	1.45
(17) Spain	1.43	.62
(14) Portugal	1.78	.22
(13) Old Austria-Hungary	1.24	.27
(15) Greece	1.19	.29
(10) Finland	1.22	.04
(16) Crete	.76	.33
(11) Rumania	.33	.06
(20) Russia	.23	.04
(19) Serbia	.09	.15
(18) Bulgaria	.12	.07
AUSTRALASIA		
(1) New Zealand	$10.24	$4.61
(2) Australia	10.77	2.53

Numbers in parentheses show position of countries in total commerce per capita with all countries. This table differs a little from the corresponding material in Table 39, Cols. E and J, because there are several methods of estimating population and of determining just how much shall be included as exports and imports.

illustrates the fact that when an energetic and advanced country assumes a protectorate over a less able and more backward one, trade is stimulated by the presence of the people of the more progressive country. In Mexico, on the other hand, the bad government which began with the fall of Diaz together with the dryness of much of the country and the relatively low stage of development, reduce the commercial importance of the average Mexican to a relatively low level. Except in the southern part Mexico is not tropical enough to produce many products that we cannot supply for ourselves. Its chief products are minerals like those which we have in large quantities; and its differences from us in government, language, and habits diminish the activity of trade and partly counteract the effect of nearness. Since 1913 Mexico's petroleum trade has greatly increased the exports to the United States, but even now a million people in Mexico are not nearly so important as a million in Canada, Cuba, or even Panama and Costa Rica. Mere nearness is not enough to cause a large trade when other conditions are unfavorable.

In Asia the fact that the Philippines in proportion to their population so far excel all other countries in trade with the United States shows the great importance of governmental control. Before the Spanish War our trade with the Philippines was no greater than with other parts of the East Indies; by the time of the Great War it had become over twenty times as great as with a similar number of people in the Dutch West Indies, for example. Japan's position, second in the Asiatic list, is in part due to the location of that country on the eastern margin of Asia, where it is more accessible than any other part of the continent. Much more important, however, is the fact that the Japanese are mentally and physically the most active people of Asia. Nevertheless, the great distance of Japan from all parts of the United States and especially from the part where most of the people live, its divergence from us in language and habits, the relative poverty of its people, and the fact that its great products like cotton cloth are much like our own, causes a given number of people in that country to be less important in our commerce than the same number of people in any part of North America and the West Indies. Even more notable than the relatively inactive state of our trade with Japan in proportion to that country's population is the extremely small amount of business with China and India. Because those countries have such an enormous population, a very small trade per inhabitant makes a large total. Hence in the ordinary tables of statistics our trade with them looks large, but if we consider it in proportion to the population, it shrinks to insignificance. Because the Chinese and the people of India are far away and especially because the density of the population and the low standards of living do not permit them to accumulate much surplus, it takes 240 million Indians to equal a million Canadians, and 360 million Chinese to be as important to us as a million Cubans. Similar conditions prevail in respect to the trade of China and India with the rest of the world, for even when their trade with all parts of the world is considered, their foreign commerce per capita stands far lower than that of any country in North America, South America, Europe, or Australia.

The fact that in proportion to the population we do nearly three times as much business with New Zealand as with the Philippines and five times as much as with Japan indicates that mere distance is not very important, at least when it is distance across the ocean. Here we have some of the most remote people in the world so far as miles of travel are concerned. The voyage from San Francisco to Melbourne is 7000 miles, while the distance to Yokohama is only 5500, to Shanghai 5550, and to Manila 6300. From New York the distance via Panama to Melbourne is 10,000 miles and to Wellington, New Zealand, 8500, while via Suez the distance to Bombay is 8100, and to Calcutta, 9800. The surprisingly large trade of Australia and New Zealand shows the importance of energy, high standards of living, good government, and similarity of language and habits,—in other words the importance of the people rather than of their geographical position and resources.

Turning to South America, it is noteworthy that the countries where the trade of the United States is largest in proportion to the population are the three southern countries, Chile, Uruguay, and Argentina. The main things which seem to put these countries ahead of others are a greater proportion of European blood, the more stimulating climate of the southern part of the continent, the better health, and the higher standards of living, which result in more stable government and better habits. These conditions overcome the effect of great distances. Of course such resources as the nitrate beds of Chile and the wonderful grass of Argentina are highly important, but if the civilization and climate where they occur were like that of central Brazil, it might be far more difficult to use them. Language, and the form as distinguished from the character of the government, seem to play a relatively small part, for the countries of southern South America are not especially different from those of northern South America in these respects. Nor do the differences between the products of the southern countries and our own have much effect, for in this respect the northern countries are much more adapted to stimulate trade.

It is surprising to find that British Guiana comes next after Argentina in its per capita trade with the United States. This means that British guidance in the production of sugar, and the British policy of free trade, raise British Guiana above other tropical countries such as Brazil with its coffee plantations, and Colombia and Venezuela with the advantage of nearness. On the other hand, Dutch Guiana falls to the bottom of the South American list because the Dutch governmental policy forces trade to go to the Netherlands. In South America the west coast countries in equatorial latitudes, that is, Ecuador and Peru, fall below the corresponding east coast countries by reason of dryness and ruggedness, while the interior countries of Bolivia and Paraguay fall lower still because of their poor transportation facilities.

The trade of the United States with Africa illustrates once more the fact that business depends on people far more than upon things. The four parts of Africa that stand highest in trade with the United States are those where the British and French are most numerous. Africa is potentially a rich continent, but it is so handicapped by the poor health, lack of energy, and low standards of its people that its business is very limited. This does not mean that *resources* are not also important. For example, in South Africa two-thirds of the surplus available to pay for imports from America depends on gold and diamonds. Even without these temporary sources of wealth, however, South Africa as well as Egypt and French North Africa, in spite of the distance from the United States, would carry on a considerable trade with us because those are the parts where Europeans are most numerous and the natives most active. Of course the trade of Africa with Europe is much larger than with the United States, for Europeans go to that continent while our people go to the corresponding regions of Latin America. In both cases a few energetic people from the north largely determine the conditions of business. The fact that Africa's trade with the United States is so small shows that even a progressive government like that of England does not overcome the racial character of the Africans. But the fact that the trade with England and the other holders of colonies is far larger than with the United States also shows that trade follows the flag.

Because of its dense population and the large proportion of its people who are active in business Europe is by far the most important continent in the trade of the United States as well as in the business of the world. The most active American trade centers at the English Channel, whence it diminishes rapidly in all directions. There many conditions combine to encourage trade, for transportation is easy, the climate is good, and the standards of civilization are high.

One of the surprising features of European trade is the way in which the importance of the Swiss per capita in American commerce rises well above that of their immediate neighbors. Switzerland is badly located for trade because it has no seacoast; it has few resources aside from its scenery; and it is hampered by the tariffs of its neighbors. Yet because its people stand high in ability and energy and have high standards not only of living but of working, so that their goods are of the best quality, a million people there are as important to the United States as 50 million in China. Another remarkable feature of the trade of Europe is the low position of Russia and the other countries of eastern Europe. A million Russians, even before the Great War, were scarcely more important in our trade than a million Chinese or Hindus, and not a tenth as important as a million Japanese. The distance by sea from New York to Odessa is 5370 miles, and to Petrograd 4632, so that Russia is much more accessible to the eastern United States than are Australia and New Zealand to either the eastern or western coasts of this country. Yet before the war a million people in New Zealand represented as much trade with us as did 50 million in Russia and today the difference is still greater. This is not because New Zealand has more articles than Russia which we especially want, for Russia and Siberia, which are here taken together, might produce much more than New Zealand in the way of commodities such as platinum, hides, and wool. The reasons for the small trade of Russia and of the other countries of eastern Europe with the United States are found partly in the lack of energy and the low standards of the people, partly in poor government, and partly in the extent to which the Russian language, customs, and ideals differ from our own.

In addition to this there is another important factor which has not yet been mentioned, namely the fact that other active countries like Britain, France, Sweden, and especially Germany lie nearer to Russia than does the United States. Even their trade with Russia, however, is slight, for so backward is that country that before the Great War a million people in Switzerland represented as much foreign commerce with all other countries as did 24 million in Russia. Other things being equal, a country deals with the nearest country where trade is active. In this fact lies the explanation of much of the disappointment of the world over America's attitude after the Great War. It was hoped that the United States would take an interest in Russia and help her to recover from the effects of the revolution. It was also proposed that the United States assume a mandate over at least a part of Turkey. But the people of America showed little interest in the matter. Because there was little trade to bind the east of Europe to America there were not many people who had an active personal interest in that disturbed part of the world. Wise people believed that it would be good for America and good for the world to have America help the Near East, and that the mere fact of a direct relationship would greatly stimulate business as has been the case in the Philippines. But geographic conditions have hitherto turned the interests of the United States so strongly to Latin America that the care of the Near East has been left to the countries that lie nearer. In western Europe, on the contrary, everything combines to give us an interest so great that we took part in the Great War and are still closely concerned in many important European affairs.

From this review of the present conditions and recent changes in the foreign trade of the United States, we may conclude that Europe, especially the North Sea regions, has been and still is our most active market both for buying and selling. But in proportion to the number of people and to the rapidity with which our trade with them increases, the countries close to us in North America and the West Indies are fast assuming a position which may make them rival Europe in some respects. Australia and the southern parts of South America are also very important to us in proportion to their population. The rest of South America, on the other hand, and still more the continent of Africa, stand surprisingly low when one considers their total trade, their trade per capita, and especially the rate at which their trade increases. Eastern Asia, on the other hand, seems to promise to be one of the great trade regions of the future. Its per capita trade is indeed small, but the vast number of its people, their relatively high capacities if rightly led, and especially the rate at which trade has recently increased, seem to put Japan, China, and the neighboring islands and peninsulas of southeastern Asia in a position of great importance to the business of America.

It seems clear that the degree of activity of commerce between this country and other parts of the world depends on a combination of causes. Mere distance, or more exactly the degree of difficulty in reaching a region no matter whether it is far or near, is very important. Nevertheless, it can be easily overcome as in the case of Australia, Switzerland, and the Philippines. Australia and Switzerland both illustrate the fact that the degree of progress in a country is one of the greatest, if not the greatest, of all factors in causing active trade. The Philippines show that governmental control is likewise a factor of the first importance, while Mexico illustrates how effectively a poor government can lessen foreign commerce. The presence of products which one country needs and another can supply, as in the case of the sugar imported from Cuba to the United States, is likewise a great stimulator of trade. Other factors such as language, customs, and established habits also play a large share in determining where trade shall be active. Yet on the whole, the great determining factors seem to be the character of the people, the diversity of products, the distance from country to country or the ease with which products can be brought from one to the other, and the degree to which trade is helped or hindered by the conditions of government.

EXERCISES AND PROBLEMS

1. Find out who carries the commerce of the United States. From Table 38 B make a bar diagram showing the relative rank of the various countries in the amount of shipping entering United States ports in 1913 compared with 1920. Arrange the diagram according to the order for 1920. Explain the reasons for this order and for the ways in which it differs from that of 1913.

2. The distribution of the ocean commerce of the United States. Let two students work together, one taking Table 38 C and D, and the other 38 E and F. On a map of the world insert symbols indicating the tonnage of the ships coming from or going to other countries in 1913. Draw lines to indicate the ocean routes along which the traffic moves in order to reach the United States. Indicate the most important types of goods that follow each route. Describe the main features of your map. How and why does it differ from that of your partner?

Draw similar maps showing the change from 1913 to 1920. Let solid rectangles, triangles, and circles serve as symbols for an increase in tonnage, while similar open symbols denote a decrease. Compare your maps and draw conclusions. Use a later year than 1920 if possible.

3. Compare the total and the per capita foreign commerce of large and small countries. Select six pairs of countries, letting each pair contain one very populous country and one country not more than a quarter as large. Let each pair of countries be as nearly alike as possible in other respects. From Table 39 B and 39 G make a table as follows:

Name of Country.		Imports per Capita 1913.		Per Capita Excess of Small over Populous. (Use Minus Signs if the Excess is the other way.)	Exports per Capita 1913.		Per Capita Excess of Small over Populous.
Populous	Small	Populous	Small		Populous	Small	

Explain your results.

4. Compare the per capita foreign commerce of tropical and non-tropical countries. Repeat Exercise 3, but let each pair consist of a tropical and non-tropical country as nearly alike as possible in size.

5. Investigate the conditions that cause various countries to differ from or resemble the United States in their foreign trade per capita. Make a list of the five countries that (*A*) stand highest in Table 39 B, (*B*) that stand nearest the United States in 39 B, and (*C*) that stand lowest. Do the same for 39 G. Explain the conditions which cause the various countries to fall into one or another of these groups.

In what respects do the countries of group *B* differ from or resemble the United States? Why do they come in its class from the point of view of per capita trade? How do the countries of each group compare with the United States in internal and external transportation facilities, Tables 33 and 34?

6. Study the trade of the United States with a typical country belonging to each of the following groups: (*A*) an advanced European country; (*B*) one of the more backward European countries; (*C*) an advanced non-European country; (*D*) an independent tropical country; (*E*) a country where the United States exercises some sort of direct or indirect political control. Find out for each country all the available facts in Tables 39 and 40, in the Statesman's Yearbook, in some good encyclopedia, and in other available sources. Describe the nature of the products sent in each direction, that is, from and to the United States. Point out the effect of each of the controlling factors mentioned in the last part of this chapter.

7. The relative importance of foreign commerce in various parts of the United States. On outline maps of the United States insert symbols to indicate the values of imports and exports at the principal customs districts of the United States. Discuss the reasons why the totals for all cities except New York fall below the total imports and exports of New Orleans. In this connection consider relation to other ports, density of population, ease of transportation to other populous countries, character of harbors, nature of main articles of import or export. So far as possible explain the cases where there is a great contrast between exports and imports.

8. Prepare an exercise to show the relation between Tables 39, 40, and 42.

9. Make a detailed investigation of the trade of Canada, as nearly as possible along the lines indicated for the United States in the preceding exercises.

PART V

STATISTICAL TABLES

The following pages contain a comprehensive series of tables. The original data for the tables may be found in or calculated from the following sources, which are referred to by letter at the heads of the tables.

A. Annuaire Internationale de Statistique, 1917, 1920.
B. United States Census Publications.
C. Statistical Abstract of the United States, 1920.
D. Yearbook of the United States Department of Agriculture, 1919 and 1920.
E. The Statesman's Yearbook, 1921.
F. The Mineral Industry during 1920.
G. The Mineral Resources of the United States, 1920.
H. Other sources such as the Statistical Abstract of the British Government, the Statistisches Jahrbuch für das Deutsche Reich, the World Almanac, the World Atlas of Commercial Geology, and the Vitality of the Peoples of America, by Raymond Pearl.

The tables cover the fields of business for which it has been possible to find data adapted to a fairly simple geographical treatment. For foreign manufacturing and internal commerce, accurate statistics are either not available or are compiled on such diverse lines that correct comparisons between one country and another are almost impossible. Since the war the data as to foreign commerce cannot easily be compared because the rates of exchange have been so demoralized that it is impossible to determine the real value of foreign goods in terms of American money.

In using the tables it should be remembered that the most instructive method is comparisons between the known and the unknown, the near and the far. Tables for the United States and for the world are given wherever possible, and it is often advisable to work out the same problem in both tables. Use your home state and the United

States as the basis of comparison in every possible problem even if they are not mentioned in the text. Then use more remote states where different types of climate, relief, position, resources and industries prevail.

Make Maps Wherever Possible; Save all Maps for Future Reference.—The maps may conveniently be numbered according to the table and column on which they are based. As soon as a file of such maps is started it will prove a fruitful source of material for problems in addition to those in the book. The drawing of the maps is usually interesting work, and is perhaps the best way of fixing the facts in the memory. Moreover, it brings out the main purpose of geography, namely an understanding of where products, activities, and so forth are located, how they are related to the physical environment, how those in one region compare with those in another, and how the general condition of a country or state, its "regional aspect" depends on the interplay of a great number of factors each of which may influence many or all of the others. Only by putting the facts on maps and comparing one map with another can these relationships be grasped or can a well-rounded view of a given region be obtained.

In using the numbers in the tables *decimals may often be omitted or only the figures for thousands or millions may be employed.* In all such cases if the omitted portion amounts to five-tenths or more of the amount which is reckoned as 1, it should be counted as equal to 1.

The number of possible problems is far greater than those given in the book. Some of the chief types are as follows. The teacher and the students can devise a great many quite as good as those here given.

1. Maps showing location and amount of population, production, activities, etc. One way to make these is to have a small dot of a given size represent a given amount as in Fig. 1, and other maps of production prepared by the United States Department of Agriculture. This however, requires so much time and information that it is generally better to follow the method illustrated in Fig. 88. There a shaded oblong, ▬ represents twenty million, a smaller oblong, ■ ten million, a solid triangle, ▲ five million, and an open circle, ○ one million or less. The symbols may represent other amounts according to the nature of the data, and their relative values may be as here, or otherwise, as 20, 10, 4, 1. In general the amount represented by each symbol should be such that the largest symbol will represent from 2 to 10 per cent of the total. Place the symbols as nearly as possible in the part of the country or state where the product or activity is actually found (see Fig. 83). Such maps give a clear idea of the distribution and intensity of activities and production. It is often advisable to construct a series of related

maps using symbols of the same value; for example a series may be drawn showing all the cereals, the animals, the metals, and so forth.

2. Where percentages, prices, or figures per capita or per square mile are given, or in other cases where the figures do not represent the total amount, one of the best methods for exercises is to insert the figures on an outline map, then draw what are known as isopleths, or lines showing equal degrees of activity just as isotherms show equal degrees of temperature. Then apply heavy shading to the areas of greatest intensity, and lighter shades to the areas of progressively less intensity. See Figs. 21 and 22. The map should be accompanied by a written explanation of the conditions which determine the geographical distribution of the activity in question. Various states and countries should be compared with the home region, and with one another, and the reasons for differences should be pointed out. Each map should be compared with others showing physical conditions or other activities and products.

3. A third general type of exercises is to prepare a table showing how a given *area* or country compares with one or more other areas, in many different respects. Discuss the nature of the differences and their reasons Bar diagrams like Fig. 46 are often a help in such comparisons.

4. A given *product* may also be followed from table to table. For example, its conditions of production, i.e., relief, soil, climate, method of cultivation, and so forth, may be compared with the yield per acre, the yield per person, the percentage of the world's production in a given country, or the extent to which it is exported or consumed.

5. A given *physical condition* such as relief, climate, or the position of a state or country may be taken as the basis, and its effect may be studied in a series of maps. For example, the influence of the Appalachian Mountains can be detected in many different sets of data, including those for minerals, agricultural products, transportation, finance, etc., as appears in Figs. 22, 33, and 35. Here, as elsewhere, the conditions near home should be the starting point, and should be continually kept in mind as one proceeds to remoter regions.

SECTION I.—AREA, POPULATION, URBAN DISTRIBUTION, GOVERNMENT, AGE AND RACE

TABLE 1.—AREA, POPULATION AND GOVERNMENT OF COUNTRIES AND COLONIES

Source: E. (1920 or nearest available date)

Continent and Country.	A. Area (Thousands of Square Miles).	B. Population (Thousands).	C. Population per Square Mile.	D. Government.
Africa:				
Abyssinia	350.	8,000	23	Independent Empire
Algeria	222.6	5,564	25	French colony
Angola (Port. W. Africa)	484.8	4,119	9	Portuguese colony
Belgian Kongo	909.7	11,000	12	Belgian colony
British E. Africa	809.	13,985	17	British colony and mandatory
British W. Africa	447.5	20,652	46	British colony
Egypt (Nile Valley)	12.2	12,778	1046	Independent kingdom (British protectorate)
(Desert Areas)	350.	100	⅓	Ditto
Eritrea	45.8	450	10	Italian colony
French (Kongo)	1037.	8,870	9	French colony
French W. Africa, Sahara	1800.6	11,464	6	French colony
Liberia	40.	1,750	43	Independent republic
Libia (Tripoli and Cyrenaica)	406.	6,000	2	Italian colony
Madagascar	228.	3,545	15	French colony
Morocco	231.5	5,400	23	French protectorate
Mozambique	426.7	3,120	7	Portuguese colony
Nyasaland	39.6	1,200	30	British colony
Rhodesia, etc. (S. Africa)	733.4	2,370	3	British colony
Somaliland (British)	68	300	4	British colony
Somaliland (French)	5.8	208	36	French colony
Somaliland (Italian)	139.4	650	5	Italian colony
Sudan (British)	1104.4	3,400	3	British colony
Swaziland	6.7	100	15	British colony
Tunis	50.	1,940	40	French colony
Union of South Africa	473.1	7,305	15	British dominion
Asia:				
Aden	10.4	58	6	British colony
Afghanistan	245.	6,381	26	Monarchy
Arabia	1000.	5,500	6	Six indep. principalities more or less under British protection
Armenia	80.	2,159	27	Independent republic
Azerbaijan	40.	4,615	115	Independent republic
Baluchistan	54.	400	7	Administration of India
Bhutan	20.	250	13	British dependency, almost indep.
Bokhara	83.	1,250	15	Russian dependency
Borneo (British)	31.	210	7	British colony
Ceylon	25.5	4,758	187	British colony
China, proper	1532.	302,000	197	Republic
Chosen (Korea)	84.	17,413	207	Japanese dependency
Dutch East Indies	683.	47,000	69	Dutch colony
Formosa	13.8	3,654	264	Japanese dependency
Georgia	32.7	3,053	93	Republic
Hong Kong	0.4	598	1495	British colony
India	1802.6	315,156	175	Member of British Empire
Indo-China	256.	16,990	66	French colony
Japan	147.7	57,998	393	Independent Empire
Khiva	24.	646	27	Russian dependency
Malay States	51.	2,299	45	British colony
Manchuria	363.6	12,740	35	Part of China (Japanese control)
Mesopotamia	143.	2,849	20	Independent state (Brit. mandatory)
Mongolia	1367.6	1,800	1	Independent kingdom
Nepal	54.	5,600	104	Indep. kingdom (British protection)

TABLE 1.—*Continued*

Continent and Country.	A. Area (Thousands of Square Miles).	B. Population (Thousands).	C. Population per Square Mile.	D. Government.
Oman	82.	500	6	Independent state (Brit. protection)
Palestine	9.	648	72	British mandatory
Persia	628.	9,500	15	Indep. kingdom (British protection)
Philippine Islands	119.5	10,351	87	U. S. possession
Russian Turkestan	420.8	6,684	16	Part of Russia (status indeterminate)
Siam	195.	8,820	45	Independent kingdom
Sikkim	2.8	90	32	Independent kingdom (Brit. protect.)
Sin-Kiang (Chinese Turkestan)	550.	2,000	4	Chinese province (indefinite)
Siberia	4832.	10,378	2	Independent republic
Steppe Provinces	710.9	4,017	6	Part of Russia (status indeterminate)
Straits Settlements	0.4	846	2115	British colony
Syria	60.	3,000	50	French mandatory
Tibet	463.2	2,000	4	Chinese province (Autonomous)
Transcaspia	235.1	553	2	Russian province
Turkey (in Asia)	174.9	8,000	46	Independent kingdom
Australia and Oceania:				
Australia	2974.6	5,437	2	Commonwealth
New South Wales	309.4	2,100	6	State of Australia
Northern Territory	523.6	4	..	State of Australia
Queensland	670.5	758	1	State of Australia
South Australia	380.1	495	1	State of Australia
Victoria	87.9	1,532	17	State of Australia
West Australia	975.9	332	..	State of Australia
Fiji Isles	7.1	164	23	British colony
Guam	0.2	13	65	Possession of the U. S.
New Guinea and Papua	176.	650	4	Australian protectorate
New Zealand	103.6	1,179	11	British dominion
Samoa (American)	0.1	8	81	Possession of U. S.
Samoa (British)	1.2	41	34	New Zealand mandate
Tasmania	26.2	217	8	Part of Commonwealth of Australia
Europe:				
Albania	11.	800	73	Independent kingdom
Austria	30.7	6,139	200	Republic
Belgium	11.4	7,577	665	Independent kingdom
Bulgaria	42.	5,000	119	Independent principality
Cyprus	3.6	315	88	British colony
Czecho-Slovakia	54.4	13,636	250	Republic
Danzig	0.7	351	500	Free city
Denmark	16.6	3,269	197	Independent kingdom
England	50.9	34,045	670	Part of Great Britain
Esthonia	23.3	1,750	75	Independent republic
Finland	125.7	3,332	27	Independent republic
Fiume	....	50	600	Free city
France	212.7	41,476	195	Independent republic
Germany	183.4	60,900	332	Independent republic
Greece	41.9	4,821	115	Independent kingdom
Hungary	35.2	7,841	222	Independent republic
Iceland	39.7	85	2	Independent kingdom (Danish king)
Irish Free State	32.6	4,390	135	British dominion
Italy	110.7	36,000	326	Independent kingdom
Jugoslavia (See Serbia)				
Latvia	24.4	1,503	62	Independent republic
Lithuania	154.5	4,800	31	Independent republic
Luxemburg	1.	264	264	Grand duchy
Netherlands	12.6	6,831	542	Independent kingdom
Northern Caucasia	85.5	5,720	67	Part of Russia (status indefinite)
Norway	125.	2,692	21	Independent kingdom
Poland	149.	24,272	163	Independent republic
Portugal	35.5	5,958	168	Independent republic
Rumania	122.3	17,393	142	Independent kingdom

TABLE 1.—*Continued*

Continent and Country.	A. Area (Thousands of Square Miles).	B. Population (Thousands).	C. Population per Square Mile.	D. Government.
Russia (not elsewhere specified)	911.4	63,105	69	Soviet republic
Scotland	30.4	4,761	157	Part of indep. Kingdom of Gt. Britain
Serb, Croat and Slovene State	95.6	11,338	119	Independent kingdom
Spain	195.1	20,784	106	Independent kingdom
Sweden	173.	5,847	34	Independent kingdom
Switzerland	16.	3,862	241	Independent republic
Turkey (in Europe)	11.	1,891	172	Independent kingdom
Ukraine	498.1	46,000	92	Independent republic
United Kingdom (old area)	121.6	46,944	386	Independent kingdom
United Kingdom (Gt. Britain)	89	42,917	482	Independent kingdom
Wales	7.5	2,025	270	Part of indep. Kingdom of Gt. Britain
North America:				
Alaska	590.9	55	..	U. S. territory
Bahama Islands	4.4	60	14	British colony
Bermuda Islands	....	22	1160	British colony
British Honduras	8.6	44	5	British colony
Canada	3603.9	8,770	3	British dominion
Alberta	252.9	560	2	Canadian province
British Columbia	353.4	572	1	Canadian province
Manitoba	231.9	680	3	Canadian province
New Brunswick	27.9	365	13	Canadian province
Northwest Territories	1207.9	16	..	Canadian province
Nova Scotia	21.1	498	24	Canadian province
Ontario	365.9	3,040	8	Canadian province
Prince Edward Island	2.2	90	41	Canadian province
Quebec	690.9	2,211	3	Canadian province
Saskatchewan	243.4	730	3	Canadian province
Yukon	206.4	8	..	Canadian province
Costa Rica	23.	459	20	Independent republic
Cuba	44.2	2,899	66	Independent republic (U. S. protect.)
Dominican Republic (Santo Domingo)	19.3	1,000	50	U. S. protectorate
Greenland (inhabited part)	46.7	13	..	Danish colony
Guatemala	48.3	2,004	41	Independent republic
Haiti	10.2	2,500	245	Independent republic
Hawaii	6.4	256	40	U. S. territory
Honduras	44.3	637	144	Independent republic
Jamaica	4.4	894	203	British colony
Mexico	767.3	15,502	20	Independent republic
Newfoundland	42.7	261	6	British colony
Nicaragua	49.2	746	15	Independent republic
Panama	32.	401	13	Indep. republic (U. S. protectorate)
Panama Canal Zone	0.4	23	58	U. S. possession
Porto Rico	3.4	1,300	381	U. S. territory
Salvador	13.2	1,336	101	Independent republic
United States	2973.9	105,683	35	Independent republic
Virgin Islands	0.1	26	260	U. S. possession
South America:				
Argentina	1153.4	8,533	7	Independent republic
Bolivia	514.2	2,890	6	Independent republic
Brazil	3275.5	30,645	9	Independent republic
British Guiana	89.5	306	3	British colony
Chile	289.8	4,038	14	Independent republic
Colombia	440.8	5,847	13	Independent republic
Dutch Guiana	46.1	110	2	Dutch colony
Ecuador	116.	2,000	17	Independent republic
French Guiana	32.	49	2	French colony
Paraguay	75.7	1,000	13	Independent republic
Peru	722.5	4,620	6	Independent republic
Uruguay	72.2	463	6	Independent republic
Venezuela	398.6	2,853	7	Independent republic

TABLE 2.—AREA, POPULATION, URBAN DISTRIBUTION, RACE AND AGE OF PEOPLE OF THE UNITED STATES BY STATES, 1920

Source: B.

	State.	A. Land Area in Square Miles.	B. Population.	C. Population per Square Mile.	D. Population in per cent of Total.	E. Per Cent Urban Towns Over 2500.	F. Per Cent in Cities Over 100,000.	G. Per Cent Native White.	H. Per Cent Foreign-born White.	I. Per Cent Negro.	J. Per Cent Under 7 Years of Age.
NEW ENGLAND	Maine.......	29,895	768,014	25.7	0.7	39.0	0.0	85.7	14.0	0.2	13.6
	N. Hampshire.	9,031	443,083	49.1	0.3	63.1	0.0	79.2	20.6	0.1	12.9
	Vermont.....	9,124	352,428	38.6	0.3	81.2	0.0	87.2	12.6	0.2	13.6
	Massachusetts	8,039	3,852,356	479.2	3.6	94.8	39.5	70.8	28.0	1.2	13.8
	Rhode Island..	1,067	604,397	566.4	0.6	97.5	39.3	69.6	28.7	1.7	14.2
	Connecticut...	4,820	1,380,631	286.4	1.3	67.8	32.2	71.1	27.3	1.5	15.3
MIDDLE ATLANTIC	New York....	47,654	10,385,227	217.9	9.8	82.7	65.6	71.1	26.8	1.9	13.5
	New Jersey...	7,514	3,155,900	420.0	3.0	78.4	34.4	72.8	23.4	3.7	14.9
	Pennsylvania .	44,832	8,720,017	194.5	8.2	64.3	30.5	80.8	15.9	3.3	16.0
EAST NORTH CENTRAL	Ohio.........	40,740	5,759,394	141.4	5.5	63.8	37.7	85.0	11.8	3.2	14.1
	Indiana......	36,045	2,930,390	81.3	2.8	50.6	10.7	92.1	5.1	2.8	13.8
	Illinois.......	56,043	6,485,280	115.7	6.1	67.9	41.7	78.5	18.6	2.8	14.2
	Michigan.....	57,480	3,668,412	63.8	3.5	61.1	30.8	78.4	19.8	1.6	15.2
	Wisconsin....	55,256	2,632,067	47.6	2.5	47.3	17.4	81.9	17.5	0.2	15.1
WEST NORTH CENTRAL	Minnesota....	80,858	2,387,125	29.5	2.3	44.1	25.8	78.9	20.4	0.4	15.2
	Iowa.........	55,586	2,404,021	43.2	2.3	36.4	5.3	89.8	9.4	0.8	14.5
	Missouri.....	68,727	3,404,055	49.5	3.2	46.6	32.2	89.3	5.5	5.2	13.6
	North Dakota.	70,183	646,872	9.2	0.6	13.6	0.0	78.6	20.3	0.1	19.5
	South Dakota.	76,868	636,547	8.3	0.6	16.0	0.0	84.3	12.9	0.1	17.4
	Nebraska.....	76,808	1,296,372	16.9	1.2	31.3	14.8	87.1	11.5	1.0	15.4
	Kansas.......	81,774	1,769,257	21.6	1.6	34.9	5.7	90.3	6.2	3.3	14.8
SOUTH ATLANTIC	Delaware.....	1,965	223,003	113.5	0.2	54.2	49.4	77.5	8.9	13.6	14.2
	Maryland....	9,941	1,449,661	145.8	1.4	60.0	50.6	76.1	7.0	16.9	14.2
	Virginia......	40,262	2,309,187	57.4	2.2	29.2	12.4	68.7	1.3	29.9	17.0
	West Virginia.	24,022	1,463,701	60.9	1.4	25.2	0.0	89.9	4.2	5.9	18.7
	North Carolina	48,740	2,559,123	52.5	2.4	19.2	0.0	69.4	0.3	29.8	19.9
	South Carolina	30,495	1,683,724	55.2	1.6	17.5	0.0	48.2	0.4	51.4	19.4
	Georgia......	58,725	2,895,832	49.3	2.7	25.1	6.9	57.8	0.6	41.7	18.0
	Florida.......	54,861	968,470	17.7	0.9	36.7	0.0	61.5	4.4	34.0	15.6
EAST SOUTH CENTRAL	Kentucky....	40,181	2,416,630	60.1	2.3	26.2	9.7	89.0	1.3	9.8	16.9
	Tennessee....	41,687	2,337,885	56.1	2.2	26.1	12.0	80.0	0.7	19.3	17.1
	Alabama.....	51,279	2,348,174	45.8	2.2	21.7	7.6	60.9	0.8	38.4	18.3
	Mississippi...	46,362	1,790,618	38.6	1.7	13.4	0.0	47.2	0.4	52.2	17.4
WEST SOUTH CENTRAL	Arkansas.....	52,525	1,752,204	33.4	1.7	16.6	0.0	72.2	0.8	27.0	17.9
	Louisiana.....	45,409	1,798,509	39.6	1.7	34.9	21.5	58.5	2.5	38.9	16.7
	Oklahoma....	69,414	2,028,283	29.2	1.9	26.6	0.0	87.8	2.0	7.4	17.7
	Texas........	262,398	4,663,228	17.8	4.4	32.4	12.1	76.3	7.7	15.9	16.4
MOUNTAIN	Montana.....	146,201	548,889	3.8	0.5	31.3	0.0	80.3	17.1	0.3	16.8
	Idaho........	83,354	431,866	5.2	0.4	27.6	0.0	89.5	9.0	0.2	17.5
	Wyoming.....	97,594	194,402	2.0	0.2	29.5	0.0	84.8	13.0	0.7	16.0
	Colorado.....	103,658	939,629	9.1	0.9	48.2	27.3	85.9	12.4	1.2	14.4
	New Mexico..	122,503	360,350	2.9	0.3	18.0	0.0	84.8	8.1	1.6	18.1
	Arizona......	113,810	334,162	2.9	0.3	35.2	0.0	63.8	23.4	2.4	17.0
	Utah.........	82,184	449,396	5.5	0.4	48.0	26.3	85.8	12.6	0.3	18.9
	Nevada......	109,821	77,407	0.7	0.1	19.7	0.0	72.2	19.1	0.4	12.4
PACIFIC	Washington...	66,836	1,356,621	20.3	1.3	55.2	30.9	78.9	18.4	0.5	13.1
	Oregon.......	95,607	783,389	8.2	0.7	49.9	33.0	85.1	13.0	0.3	12.9
	California....	155,652	3,426,861	22.0	3.2	68.0	37.9	75.4	19.9	1.1	11.4

TABLE 3.—FOREIGN-BORN WHITES PER 1000 POPULATION IN THE UNITED STATES BY COUNTRY OF ORIGIN, 1920

Source: B.

State.	A. Great Britain.	B. Ireland.	C. Scandinavia and Finland.	D. Low Countries, France and Switzerland.	E. Germany and Austria.	F. Poland, Czecho-Slovakia, Hungary and Jugoslavia.	G. Russia and South-east Europe.	H. South Europe (Peninsula).	I. Armenia, Syria and Turkey in Asia.	J. Canada.	K. Mexico.
Alabama	1	..	1	..	1	1	1	2	..	..	..
Arizona	11	4	6	2	6	5	2	8	1	6	180
Arkansas	1	..	..	1	3	1	..	1	..	1	..
California	24	14	22	14	24	8	8	40	2	10	26
Colorado	15	7	16	4	19	7	18	15	..	8	12
Connecticut	22	33	17	4	26	49	37	62	2	18	..
Delaware	9	13	1	1	10	19	12	23	..	2	..
Florida	6	1	3	1	4	1	2	10	..	4	7*
Georgia	1	..	..	..	1	1	1	1	..	..	..
Idaho	15	3	25	5	11	2	3	8	..	11	3
Illinois	12	12	24	7	39	44	24	17	..	6	1
Indiana	4	2	2	3	16	12	4	4	..	2	..
Iowa	8	4	24	8	31	6	3	3	..	4	1
Kansas	7	3	8	4	16	5	7	2	..	..	8
Kentucky	1	1	..	1	5	1	1	1	..	..	..
Louisiana	1	1	1	3	3	1	1	10	1	1	1
Maine	10	8	7	..	2	3	8	5	1	97	..
Maryland	5	5	1	1	17	13	19	7	..	1	..
Massachusetts	30	48	16	3	8	19	29	43	4	70	..
Michigan	17	5	19	14	29	40	16	10	2	45	..
Minnesota	6	4	104	5	36	19	8	4	..	14	..
Mississippi	..	..	..	..	1	..	..	1	..	..	..
Missouri	4	4	2	3	19	7	6	1	..	2	1
Montana	22	13	43	8	20	14	10	10	..	26	..
Nebraska	6	4	26	3	35	17	12	4	..	4	2
Nevada	28	13	19	13	16	10	2	59	..	15	15
New Hampshire	14	18	9	2	5	9	10	17	2	106	..
New Jersey	21	21	7	11	41	48	27	52	1	3	..
Mew Mexico	4	1	2	1	5	3	1	6	1	2	45
New York	17	27	10	6	43	36	56	56	1	11	..
North Carolina	1	..	..	..	..	..	..	..	..	..	..
North Dakota	5	3	84	4	22	11	49	1	..	24	..
Ohio	11	5	3	4	28	37	11	13	1	4	..
Oklahoma	2	1	1	1	2	2	2	1	..	1	3
Oregon	16	5	35	9	21	6	9	9	..	22	1
Pennsylvania	16	14	3	3	28	41	23	27	1	2	..
Rhode Island	52	37	12	5	7	13	15	70	5	60	..
South Carolina	..	..	..	..	1	..	1	1	..	..	..
South Dakota	6	3	51	7	26	7	18	1	..	7	..
Tennessee	1	1	..	..	1	1	1	1	..	..	..
Texas	2	1	2	1	8	4	2	2	..	1	53
Utah	41	3	36	9	10	2	2	14	..	3	2
Vermont	13	8	5	1	3	6	4	14	1	70	..
Virginia	2	1	1	..	2	1	2	2	..	1	..
Washington	23	7	63	8	21	8	8	11	..	32	..
West Virginia	..	..	..	..	1	1	..	1	..	..	..
Wisconsin	6	3	35	8	65	34	10	6	1	7	..
Wyoming	22	5	23	3	18	14	8	16	..	7	9

* Cuba.

SECTION II.—CITIES

TABLE 4.—FOREIGN CITIES OF OVER 300,000 POPULATION AND OTHER IMPORTANT PORTS

Source: E.

Continent, Country, and City.	Population.	Year.
AFRICA		
Algeria		
Algiers	172,000	’12
Egypt		
Alexandria	414,000	’14
Cairo	726,000	’14
Union of S. Africa		
Capetown	30,000	’11
Port Natal (Durban)	......	..
ASIA		
Arabia		
Aden	46,000	’11
Asia Minor		
Smyrna	375,000	est.
China		
Canton	900,000	’18
Changsha	536,000	’18
Chungking	438,000	’18
Fuchow	624,000	’18
Hangchow	634,000	’18
Hankow	1,444,000	’18
Hong Kong	598,000	’19
Nanking	376,000	’18
Ningpo	620,000	’18
Peking	1,000,000	’18
Shanghai	1,000,000	’18
Suchow	500,000	’18
Tientsin	800,000	’18
Georgia		
Batum	46,000	’12
India		
Bombay	979,000	’11
Calcutta	1,222,000	’11
Colombo	211,000	’11
Hyderabad	501,000	’11
Madras	519,000	’11
Rangoon	293,000	’11
Japan		
Kobe	609,000	’20
Kyoto	591,000	’20
Moji	73,000	’18
Nagasake	177,000	’20
Nagoya	430,000	’20
Osaka	1,253,000	’20
Tokio	2,173,000	’20
Yokohama	423,000	’20
Malasia		
Singapore	387,000	’19
Siam		
Bangkok	630,000	’18
EUROPE		
Austria		
Vienna	1,842,000	’20
Belgium		
Antwerp	323,000	’19
Brussels	685,000	’19
Czecho-Slovakia		
Prague	224,000	’10
Denmark		
Copenhagen	606,000	’16
France		
Bordeaux	262,000	’11
Boulogne	53,000	’11
Cherbourg	44,000	’11
Dunkirk	39,000	’11
EUROPE—*Continued*		
Havre	136,000	’11
Lyons	524,000	’11
Marseille	551,000	’11
Paris	2,888,000	’11
Germany		
Berlin	1,903,000	’19
Bremen	258,000	’19
Bremerhafen	22,000	’19
Breslau	528,000	’19
Chemnitz	304,000	’19
Charlottenburg	323,000	’19
Cologne	634,000	’19
Dresden	529,000	’19
Düsseldorf	407,000	’19
Essen	439,000	’19
Frankfort	433,000	’19
Hamburg	986,000	’19
Hanover	310,000	’19
Leipzig	604,000	’19
Munich	631,000	’19
Nürnberg	353,000	’19
Stuttgart	309,000	’19
Great Britain		
Birmingham	898,000	’19
Bradford	295,000	’19
Bristol	376,000	’19
Cardiff	213,000	’19
Edinburgh	338,000	’19
Grimsby	82,000	’19
Glasgow	1,113,000	’19
Harwich	13,000	’21
Hull (Kingston)	291,000	..
Leeds	449,000	’19
Leith	84,000	’19
Liverpool	805,000	’19
London	4,540,000	’19
Manchester	772,000	’19
Newcastle	287,000	’19
Sheffield	493,000	’19
Southampton	131,000	’19
Westham	300,000	’19
Greece		
Athens Piræus	300,000	est. ’20
Hungary		
Budapest	1,185,000	’21
Ireland		
Belfast	393,000	’19
Cork	77,000	’11
Dublin	399,000	’19
Italy		
Florence	242,000	’15
Genoa	300,000	’15
Milan	663,000	’15
Naples	698,000	’15
Palermo	346,000	’15
Rome	591,000	’15
Trieste	230,000	est.
Turin	452,000	’15
Malta	229,000	’11
Netherlands		
Amsterdam	609,000	’15
Hague	312,000	’15
Rotterdam	473,000	’15
Poland		
Lodz	430,000	’20
Warsaw	980,000	’20
EUROPE—*Continued*		
Portugal		
Lisbon	435,000	’11
Russia		
Kherson	96,000	’13
Kiev	626,000	’13
Libau	91,000	’13
Moscow	1,817,000	’15
Nikolaiev	106,000	’13
Novorossisk	66,000	’13
Odessa	613,000	’12
Petrograd (Kronsted)	2,133,000	’14
Reval	96,000	’13
Riga	558,000	’13
Rostov	205,000	’13
Taganrog	68,000	’13
Spain		
Barcelona	619,000	’18
Bilboa	100,000	’18
Gibraltar	25,000	’20
Madrid	652,000	’18
Valencia	245,000	’18
Sweden		
Stockholm	415,000	’19
Turkey		
Constantinople	1,000,000	est.
NORTH AMERICA		
Canada		
Montreal	470,000	’11
Toronto	377,000	’11
Vancouver	100,000	’11
Victoria	32,000	’11
Cuba		
Havana	364,000	’19
Mexico		
Mexico City	471,000	’10
Vera Cruz	49,000	’10
Tampico	......	..
SOUTH AMERICA		
Argentina		
Buenos Aires	1,599,000	’16
Brazil		
Bahia	348,000	’13
Rio Janeiro	1,159,000	’20
Santos	35,000	’11
São Paulo	504,000	’19
Chile		
Antofagasta	69,000	’19
Iquique	48,000	’19
Santiago	425,000	’19
Valparaiso	218,000	’19
Peru		
Callao	34,000	’05
Uruguay		
Montevideo	362,000	’20
AUSTRALIA		
Adelaide	257,000	’19
Freemantle, Perth	142,000	’19
Melbourne	743,000	’19
Sydney	829,000	’19

TABLE 5.—PERCENTAGE OF POPULATION IN TOWNS OF OVER 50,000 BEFORE THE GREAT WAR: EUROPE

Source: E, 1916

	Per Cent Urban.		Per Cent Urban.		Per Cent Urban.
Austria	14	Italy	16	Serbia	3
Bosnia-Herzegovina	3	Netherlands	30	Spain	14
Belgium	19	Norway	13	Sweden	12
Bulgaria	3.5	Portugal	11	Switzerland	15
Denmark	22	Rumania	9	United Kingdom	43
France	21	Russia	9	England	48
Germany	25	Caucasus	2	Ireland	18
Greece	9	Finland	5	Scotland	38
Hungary	5	Poland	13		

TABLE 6.—UNITED STATES. CITIES OF OVER 100,000 POPULATION, AND METROPOLITAN DISTRICTS, 1920

Source: B.

City and State.	A. Population, 1920.	B. Population of Metropolitan District, 1920.	City and State.	A. Population, 1920.	B. Population of Metropolitan District, 1920.
Akron, Ohio	208,435	285,113	Nashville, Tenn	118,342	....
Albany, N. Y	113,344	....	Newark N. J	414,524	....
Atlanta, Ga	200,616	249,226	New Bedford, Mass	121,272	....
Baltimore, Md	733,826	787,458	New Haven, Conn	162,537	....
Birmingham, Ala	178,806	....	New Orleans, La	387,219	397,915
Boston, Mass	748,060	1,772,254	New York, N. Y	5,620,048	7,910,415
Bridgeport, Conn	143,555	....	Norfolk, Va	115,777	....
Buffalo, N. Y	506,775	602,847	Oakland, Calif	216,261	(3)
Cambridge, Mass	109,694	....	Omaha, Nebr	191,601	....
Camden, N. J	116,309	....	Paterson, N. J	135,875	....
Chicago, Ill	2,701,705	3,178,924	Philadelphia, Pa	1,823,779	2,407,234
Cincinnati, Ohio	401,247	606,850	Pittsburgh, Pa	588,343	1,207,504
Cleveland, Ohio	796,841	925,720	Portland, Ore	258,288	299,882
Columbus, Ohio	237,031	260,338	Providence, R. I	237,595	444,228
Dallas, Texas	158,976	....	Reading, Pa	107,784	....
Dayton, Ohio	152,559	....	Richmond, Va	171,667	....
Denver, Colo	256,491	264,232	Rochester, N. Y	295,750	320,966
Des Moines, Iowa	126,468	....	Salt Lake City, Utah	118,110	....
Detroit, Mich	993,678	1,165,153	San Antonio, Texas	161,379	....
Fall River, Mass	120,485	....	San Francisco, Calif	506,676	891,477
Forth Worth, Texas	106,482	....	Scranton, Pa	137,783	....
Grand Rapids, Mich	137,634	....	Seattle, Wash	315,312	357,950
Hartford, Conn	138,036	....	Spokane, Wash	104,437	....
Houston, Texas	138,276	....	Springfield, Mass	129,614	....
Indianapolis, Ind	314,194	339,105	St. Louis, Mo	772,897	952,012
Jersey City, N. J	298,103	....	St. Paul, Minn	234,698	(2)
Kansas City, Kansas	101,177	(1)	Syracuse, N. Y	171,717	....
Kansas City, Mo	324,410	477,354	Toledo, Ohio	243,164	263,717
Los Angeles, Calif	576,673	879,008	Trenton, N. J	119,289	....
Louisville, Ky	234,891	318,159	Washington, D. C	437,571	506,588
Lowell, Mass	112,759	....	Wilmington, Del	110,168	....
Memphis, Tenn	162,351	....	Worcester, Mass	179,754	....
Milwaukee, Wis	457,147	537,737	Yonkers, N. Y	100,176	....
Minneapolis, Minn	380,582	629,216	Youngstown, Ohio	132,358	....

(1) Included with metropolitan district of Kansas City, Mo.

(2) Included with metropolitan district of Minneapolis, Minn.

(3) Included with metropolitan district of San Francisco, Calif,

SECTION III.—OCCUPATIONS

TABLE 7.—WORLD. PERCENTAGE OF GAINFULLY EMPLOYED POPULATION ENGAGED IN AGRICULTURE

(Data from other countries not available)

Source: D.

Continent and Country.	A. Year.	B. Percentage Engaged in Agriculture.
AFRICA		
Algeria	1881	71.3
Egypt	1907	65.6
Sierra Leone	1901	25.9
Union of South Africa	1904	65.1
ASIA		
British India	1901	67.9
British North Borneo	1901	64.2
Ceylon	1901	65.1
Federated Malay States	1901	35.5
Formosa	1905	73.3
Philippine Islands	1903	41.3
Russia in Asia	1897	65.3
AUSTRALASIA		
Australia	1911	24.3
New Zealand	1911	24.5
EUROPE		
Austria	1900	60.9
Belgium	1900	21.9
Bulgaria	1905	82.4
Cyprus	1901	54.5
Denmark	1911	40.3
England and Wales	1911	7.8
Finland	1900	48.0
France	1906	42.4
EUROPE—*Continued*		
Germany	1907	34.6
Greece	1907	44.6
Hungary	1901	69.7
Ireland	1911	43.0
Italy	1901	58.8
Netherlands	1899	29.6
Norway	1910	33.4
Portugal	1900	61.4
Russia in Europe	1897	55.6
Scotland	1911	11.0
Serbia	1900	64.7
Spain	1900	56.9
Sweden	1900	52.8
Switzerland	1900	30.4
NORTH AMERICA		
Canada	1901	39.9
Cuba	1907	47.6
Jamaica	1911	66.1
Porto Rico	1899	62.8
United States	1920	26.3
SOUTH AMERICA		
Argentina	1895	23.6
Bolivia	1900	43.5
Chile	1907	37.7
Trinidad and Tobago	1901	48.4

TABLE 8.—UNITED STATES. OCCUPATIONS, 1920

Source: B.

Division and States.		Persons Engaged in Gainful Occupations.		Per Cent of Persons in general Occupational Classes.								
		A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.
		Per Cent of Males 10 Years and Over.	Per Cent of Females 10 Years and Over.	Agriculture and Forestry.	Extraction of Minerals.	Manufacturing and Mechanical Industries.	Transportation.	Trade.	Public Service.	Professional Service..	Domestic and Personal Service.	Clerical Occupations.
New England:	Maine	77.9	21.1	25	2.4	39	7.9	8.9	1.8	5.4	7.8	4.9
	N. Hampshire	79.2	27.3	16	2.1	51	6.4	7.6	1.5	4.9	7.3	4.8
	Vermont	77.2	19.2	32	1.4	32	6.7	7.9	1.3	5.5	8.4	4.6
	Massachusetts	80.9	31.6	3	0.1	51	7.1	11.2	2.2	5.7	8.6	10.4
	Rhode Island	82.0	32.7	3	0.0	59	5.8	9.6	3.1	4.4	7.0	8.1
	Connecticut	81.0	27.1	6	0.0	54	5.6	9.5	1.7	5.3	7.1	10.4
Middle Atlantic:	New York	80.5	26.9	7	0.2	39	9.0	13.1	2.2	6.3	10.4	12.6
	New Jersey	80.7	23.9	5	0.3	48	8.5	11.0	2.6	5.4	8.0	11.5
	Pennsylvania	79.5	20.7	8	9.7	42	8.3	9.9	1.6	4.9	7.4	8.3
East North Central:	Ohio	79.4	18.3	16	2.6	42	7.5	10.7	1.4	5.1	7.0	8.2
	Indiana	77.7	16.0	26	3.0	32	7.5	10.3	1.3	5.1	6.5	6.2
	Illinois	78.8	21.3	14	3.3	33	8.4	13.3	1.9	5.6	8.2	11.3
	Michigan	79.9	18.0	20	1.9	42	6.2	9.6	1.4	4.9	6.5	7.7
	Wisconsin	75.8	18.3	31	0.4	34	6.1	9.2	1.1	5.2	6.9	6.1
West North Central:	Minnesota	75.2	18.4	34	1.7	22	7.7	11.5	1.3	6.1	7.8	7.5
	Iowa	73.2	15.2	38	1.7	20	7.8	11.9	1.1	6.5	6.9	5.4
	Missouri	77.4	18.1	30	1.6	25	7.8	12.0	1.4	5.2	8.6	8.0
	North Dakota	70.9	13.0	58	0.6	9	6.0	9.1	0.8	6.3	6.4	3.6
	South Dakota	72.2	13.3	54	0.7	12	5.9	10.1	0.9	6.4	6.1	3.6
	Nebraska	72.9	14.8	41	0.0	18	8.0	12.0	1.2	6.6	6.8	5.9
	Kansas	73.8	13.7	37	3.3	19	9.2	10.8	2.0	6.2	6.6	5.3
South Atlantic:	Delaware	79.6	20.8	19	0.0	38	8.7	8.9	1.7	4.6	9.5	9.1
	Maryland	80.0	23.8	16	1.1	34	9.3	11.0	3.6	4.9	11.1	8.8
	Virginia	76.4	18.1	36	2.0	23	7.6	7.8	3.8	4.1	10.1	4.8
	West Virginia	76.0	11.2	25	21.1	24	7.7	9.0	0.9	4.6	5.5	3.8
	N. Carolina	75.5	21.9	53	0.2	23	4.1	5.9	1.0	3.3	6.3	2.3
	S. Carolina	77.6	33.4	62	0.1	16	3.3	5.0	1.6	2.7	7.0	1.8
	Georgia	78.6	26.7	51	0.2	16	4.9	6.8	1.7	3.1	9.5	3.4
	Florida	77.7	23.3	32	0.8	26	7.6	9.3	2.0	4.5	13.5	4.0
East South Central:	Kentucky	77.1	14.5	46	6.0	17	5.9	7.6	2.0	3.7	7.1	4.1
	Tennessee	76.5	17.2	48	2.1	18	6.2	8.1	0.9	3.7	8.8	3.7
	Alabama	79.5	25.8	55	3.9	17	4.6	5.5	0.7	2.8	7.8	2.4
	Mississippi	78.7	29.1	70	0.0	10	3.8	4.3	0.7	2.7	6.3	1.6
West South Central:	Arkansas	77.7	18.2	65	0.9	12	4.5	6.1	1.3	3.2	5.5	2.1
	Louisiana	77.2	22.4	43	1.1	20	7.5	7.9	1.5	3.4	10.7	4.7
	Oklahoma	73.6	13.2	46	5.6	15	6.4	9.5	1.3	5.0	6.2	4.4
	Texas	76.6	17.8	46	1.8	16	7.3	9.4	2.7	4.4	7.8	4.7
Mountain:	Montana	78.9	15.2	40	7.8	15	8.8	8.9	1.4	5.9	7.3	4.9
	Idaho	75.5	12.0	47	3.4	16	7.3	9.0	1.1	5.8	6.0	4.0
	Wyoming	81.7	15.0	32	10.8	19	12.1	7.5	1.9	5.1	7.5	4.3
	Colorado	76.8	17.8	27	6.4	20	8.8	12.5	1.9	6.8	9.0	6.8
	New Mexico	74.5	12.1	45	6.0	13	9.0	6.6	5.3	5.1	6.9	2.9
	Arizona	78.1	16.4	28	11.8	18	8.9	8.6	6.4	5.5	4.8	7.8
	Utah	74.0	13.7	39	6.8	22	8.3	11.0	1.7	6.7	6.8	7.1
	Nevada	84.3	17.7	23	16.5	19	11.5	7.5	1.6	6.3	10.0	4.6
Pacific:	Washington	80.2	18.7	23	1.5	31	9.2	11.6	2.2	6.3	8.1	7.1
	Oregon	78.0	18.4	28	0.7	27	9.0	11.4	1.5	6.8	7.8	6.8
	California	80.0	21.4	18	1.6	28	8.2	13.8	3.0	7.7	10.2	8.8
UNITED STATES		78.2	21.2	26	2.6	31	7.4	10.2	1.9	5.2	8.2	7.5

SECTION IV.—USE, VALUE AND TENURE OF THE LAND

TABLE 9.—WORLD. THE USE OF THE LAND

Source: A. (Pre-war data)

Continent and Country.	Division According to Productivity.		Division of Productive Land (Column A) According to Use.					Division of Arable Land (Column C) According to Type of Cultivation			
	Productive.	Unproductive or Unknown.	Arable Land.	Natural Meadows and Pastures.	Land Devoted to Tree Culture.	Woods and Forests.	Swamps, Marshes and other Uncultivated Land which might be Productive.	Cereals.	Hay and Forage.	Food Plants.	Industrial Plants.
	Percentages of Total Area		Percentages of Column A.								
	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.
EUROPE.											
Austria (pre-war area)	94.3	5.7	37.6	25.4	2.1	34.6	0.3	62.7	13.5	14.8	3.4
Belgium	87.8	12.2	52.3	20.0	3.4	20.1	4.2	56.0	19.0	16.9	7.1
Bulgaria	79.6	20.4	45.2	16.6	1.3	36.9	.....	72.2	3.6	2.8	0.6
Denmark	95.5	4.5	69.4	8.3	1.6	8.9	11.8	44.6	38.6	6.9	1.4
France	90.6	9.4	44.5	21.0	5.0	20.3	9.2	49.5	21.7	8.6	0.7
Germany	94.3	5.7	50.0	16.8	1.4	27.9	3.9	60.1	14.2	15.3	2.6
Great Britain and Ireland	85.1	14.9	28.5	66.7	0.1	4.7	.....	47.1	30.6	18.7	0.7
Hungary	96.2	3.8	45.6	22.9	2.5	28.8	0.2	72.7	10.7	5.2	2.0
Italy	92.1	7.9	49.8	23.4	5.6	17.3	3.9	54.5	15.9	9.3	1.2
Netherlands	90.0	10.0	30.5	42.6	2.6	8.2	16.1	47.1	11.1	31.7	8.1
Norway	28.7	71.3	8.0	17.5	0.1	74.4	.....	22.7	68.5	8.7	.....
Portugal	78.5	21.5	33.4	27.5	11.1	28.0	.....	.....	.....	.....	.....
Rumania	76.6	23.4	60.2	15.1	1.8	22.9	.....	83.9	0.9	1.2	5.2
Russia	54.7	45.3	35.2	9.7	0.01	55.1	.....	90.4	.....	5.9	3.7
Serbia	52.3	47.7	40.6	23.2	.....	81.9	0.1	92.7	0.5	2.6	1.0
Spain	90.4	9.6	36.6	45.6	7.0	10.8	.....	43.5	1.3	6.8	1.8
Sweden	68.9	31.1	13.6	4.4	.....	81.9	0.1	43.6	39.8	4.8	0.8
Switzerland	77.6	22.4	33.5	21.5	0.6	30.7	13.7	10.9	80.7	7.3	0.1
NORTH AMERICA											
Canada	4.8	95.2	43.9	36.0	0.4	15.9	3.8	48.9	19.1	2.6	2.9
Costa Rica	23.2	76.8	14.3	11.1	6.5	56.6	11.5	8.2	65.8	17.4	7.8
Cuba	30.8	69.2	8.9	48.1	1.4	41.6	.....	9.0	.....	21.8	65.2
Porto Rico	.....	.....	26.8	49.8	.....	.....	.....	.....	.....	17.4	53.7
United States (excluding Alaska)	46.2	53.8	33.4	20.1	0.9	21.7	23.9	65.2	18.7	3.2	12.9
ASIA											
Formosa	22.3	77.7	95.5	.....	4.5	.....	.....	65.0	.....	18.5	16.5
India (British provinces)	76.9	23.1	56.7	23.5	1.5	18.3	.....	52.4	2.7	16.3	12.5
Indo-China (French)	42.8	57.2	16.3	.....	0.3	83.4	.....	87.2	.....	3.4	1.2
Japan	78.6	21.4	24.5	.....	1.9	61.5	12.0	70.9	.....	20.1	3.1
Siberia (all Asiatic Russia)	17.8	82.2	4.7	3.9	0.1	91.3	.....	93.3	.....	1.7	5.0
AFRICA											
Algeria	40.7	59.3	22.5	4.1	1.9	13.9	57.6	64.9	0.6	1.9	0.2
Egypt	2.2	97.8	99.5	.....	0.5	.....	.....	48.4	17.9	6.5	22.7
Morocco (French protectorate)	31.2	68.8	27.8	64.0	0.7	6.4	1.1	92.2	.....	5.4	2.1
Tunis	72.0	28.0	31.1	1.1	4.1	12.2	51.5	39.9	1.1	0.9	9.1
Union of South Africa	3.3	96.7	95.4	.....	.....	4.6	.....	68.4	5.9	2.3	2.3
SOUTH AMERICA											
Argentina	73.7	26.3	8.3	72.0	0.4	19.3	.....	52.9	37.8	0.7	8.6
Chile	8.1	91.9	16.9	14.9	1.2	67.0	.....	45.3	48.1	6.5	.....
Uruguay	88.5	11.5	4.8	92.4	0.2	2.6	.....	74.4	14.3	7.8	3.1
AUSTRALASIA AND EAST INDIES											
Australia	6.7	93.3	16.5	2.9	0.3	80.4	.....	62.1	14.7	1.2	0.9
Dutch East Indies (Java)	58.9	41.1	72.0	(?)	(?)	21.8	(?)	44.0	25.8	.....	.....
New Zealand	56.1	13.9	11.9	58.0	0.2	29.9	.....	6.9	80.4	7.1	.....

TABLE 10.—UNITED STATES. USE, VALUE AND TENURE OF LAND, AND RACE OF FARMERS, 1920.

Sources: B and D.

State.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.
	Per Cent of Improved Land.	Average Size of Farms in Acres.	Average Area of Improved Land per Farm.	Average Value per Farm.	Average Value of All Farm Land per Acre.	Average Value of Good Plow Land per Acre.	Per Cent of Farms Worked by Owners.	Per Cent of Farms Worked by Managers.	Per Cent of Farms Worked by Tenants.	Per Cent of Native-born White Farmers.	Per Cent of Foreign-born White Farmers.	Country of Most Numerous Foreign Farmers.	Per Cent of Colored Farmers.	Race of Most Numerous Colored Farmers.
Ala.	30	76	39	$ 2,698	$ 21	$ 43	41.8	0.3	57.9	62.4	0.4	Germany	37.2	Negro
Ariz.	1	582	72	23,418	27	180	78.9	3.1	18.1	82.9	10.7	Mexico	6.4	Indian
Ark.	27	75	40	3,974	35	65	48.4	0.3	51.3	68.0	0.9	Germany	31.1	Negro
Calif.	13	250	101	29,158	95	175	74.4	4.2	21.4	65.3	29.0	Italy	5.7	Japanese
Colo.	12	408	129	17,966	31	88	75.6	1.5	23.0	83.2	15.9	Russia	0.9	Japanese
Conn.	23	84	31	10,019	53	100	86.8	4.7	8.5	66.0	33.6	Germany	0.4	Negro
Del.	52	93	14	7,903	45	86	59.3	1.4	39.3	87.9	3.6	Germany	8.5	Negro
Fla.	7	112	43	6,116	38	53	71.3	3.4	25.3	72.0	4.1	Germany	23.9	Negro
Ga.	35	82	42	4,366	35	63	32.9	0.5	66.6	58.0	0.1	Germany	41.9	Negro
Idaho.	8	199	107	17,008	61	135	82.3	1.8	15.9	83.8	15.0	Germany	1.2	Indian
Ill.	76	135	115	28,108	164	213	55.9	1.4	42.7	90.5	9.3	Germany	0.2	Negro
Ind.	73	103	81	14,831	105	150	66.9	1.1	32.0	96.6	3.1	Germany	0.3	Negro
Iowa.	81	157	134	39,942	200	257	57.1	1.2	41.7	85.0	15.0	Germany	....	....
Kans.	58	275	185	19,982	55	90	58.7	0.9	40.4	88.7	10.4	Germany	0.9	Negro
Ky.	54	80	52	5,587	49	95	66.3	0.4	33.4	95.0	0.4	Germany	4.6	Negro
La.	19	74	42	4,354	38	65	42.3	0.6	57.1	52.6	1.7	Italy	45.7	Negro
Maine.	10	113	41	5,609	21	56	94.2	1.6	4.2	90.9	9.1	Canada	....	....
Md.	49	99	66	9,678	55	82	68.5	2.6	28.9	84.0	3.3	Germany	12.7	Negro
Mass.	18	78	28	9,389	51	103	87.8	5.1	7.1	71.7	27.9	Canada	0.4	Negro
Mich.	35	97	66	8,976	50	80	81.1	1.2	17.7	75.0	24.6	Canada	0.4	Negro
Minn.	42	169	120	21,221	91	120	74.4	0.9	24.7	62.2	37.7	Sweden	0.1	Indian
Miss.	31	67	34	3,546	35	49	33.6	0.4	66.1	40.5	0.2	Italy	59.3	Negro
Mo.	57	132	94	13,654	75	110	70.4	0.9	28.8	95.4	3.2	Germany	1.4	Negro
Mont.	12	608	191	17,095	20	48	87.2	1.6	11.3	71.2	26.9	Norway	1.9	Indian
Nebr.	47	339	186	33,771	79	150	56.0	1.1	42.9	79.9	19.8	Germany	0.3	Indian
Nev.	1	745	188	31,546	25	110	85.3	5.3	9.4	65.2	28.0	Italy	6.8	Indian
N. H.	12	127	34	5,782	18	64	90.6	2.7	6.7	87.2	12.8	Canada	....	....
N. J.	32	77	52	10,499	62	104	73.7	3.3	23.0	76.0	22.3	Italy	1.7	Negro
N. Mex.	2	818	58	10,896	8	60	86.3	1.5	12.2	88.9	4.6	Mexico	6.5	Indian
N. Y.	43	107	68	9,879	38	84	78.5	2.3	19.2	86.4	13.3	Germany	0.3	Indian
N. Car.	26	74	30	4,634	43	87	56.1	0.3	43.5	71.7	0.1	Germany	28.2	Negro
N. Dak.	55	466	316	22,651	35	49	73.3	1.1	25.6	52.7	46.7	Norway	0.6	Indian
Ohio.	71	92	72	12,060	86	132	69.3	1.2	29.5	93.8	5.5	Germany	0.7	Negro
Okla.	41	166	94	8,649	37	63	48.6	0.5	51.0	87.4	3.0	Germany	9.6	Negro
Ore.	8	270	98	16,304	43	130	79.4	1.8	18.8	80.5	18.3	Germany	1.2	Indian
Pa.	41	87	59	8,551	41	86	75.9	2.2	21.9	92.6	7.2	Germany	0.2	Negro
R. I.	19	81	33	8,238	44	105	79.5	5.0	15.5	76.5	23.0	Canada	0.5	Negro
S. Car.	32	65	32	4,946	52	82	35.1	0.4	64.5	43.4	0.1	Germany	56.5	Negro
S. Dak.	37	464	244	37,835	64	108	64.1	1.0	34.9	70.6	27.2	Germany	2.2	Indian
Tenn.	42	77	44	4,953	41	90	58.6	0.3	41.4	84.5	0.3	Italy	15.2	Negro
Texas.	2	262	72	10,200	28	72	46.1	0.6	53.3	75.0	6.8	Mexico	18.2	Negro
Utah.	3	197	67	12,130	42	135	88.0	1.2	10.9	83.0	15.5	England	1.5	Indian
Vt.	29	146	58	7,661	20	59	86.4	2.0	11.6	86.9	13.0	Canada	0.1	Negro
Va.	37	100	51	6,425	41	73	73.2	1.1	25.6	73.5	0.9	England	25.6	Negro
Wash.	16	200	108	15,952	60	150	79.5	1.8	18.7	68.3	29.8	Sweden	1.9	Japanese
W. Va.	36	110	63	5,687	32	75	82.6	1.2	16.2	98.5	0.9	Germany	0.6	Negro
Wis.	35	117	66	14,143	73	125	84.3	1.3	14.4	71.2	28.5	Germany	0.3	Indian
Wyo.	3	750	134	21,235	18	70	85.1	2.4	12.5	84.5	14.4	Germany	1.1	Indian

SECTION V.—AGRICULTURE

TABLE 11.—WORLD. ANNUAL YIELD OF CHIEF CROPS

Source: D.

(Average 1909–1913)

Continent and Country.	A. Corn, Millions of Bushels.	B. Wheat, Millions of Bushels.	C. Oats, Millions of Bushels.	D. Barley, Millions of Bushels.	E. Rye, Millions of Bushels.	F. Rice, Millions of Pounds.	G. Potatoes, Millions of Bushels.	H. Cotton, Thousands of Bales.	I. Tobacco, Millions of Pounds.	J. Sugar,[1] Thousands of Short Tons.
AFRICA	91.2	77.8	24.5	51.9	.....	1,508.0	5.1	1,473.3	40.5	458.4
Algeria	0.5	33.1	13.0	42.0	.....	....	1.8	......	24.0	......
Egypt	64.2	34.0	.....	.....	.....	552.8	.....	1,451.6	.....	67.1[1]
Madagascar	.....	.....	.....	.....	.....	953.0	(Ugand	a 17.6) (	Mauriti	us233.7)
Nyasaland	.....	.....	.....	.....	.....	2.2	.....	4.0	2.4	......
Tunis	.....	6.1	4.3	8.0	.....	....	.....	......	0.3	......
Union of South Africa	26.5	4.6	7.2	2.0	.....	....	3.3	0.1	13.8	129.9
ASIA	98.3	513.6	87.8	143.9	24.7	106,509.8	57.9	4,330.7	837.4	4566.6
Central Asia (Transcaspia, Turkestan*)	.....	29.3	15.0	5.1	1.0	378.4	5.2	658.1	30.9	......
Cyprus	.....	2.3	0.4	2.2 (	Malay S	tates 80.4)	.....	6.6	......	......
Dutch East Indies	.....	.....	.....	.....	.....	7,349.4[2]	.....	15.1	163.9	1513.7[3]
Formosa	.....	0.2	.....	0.1	.....	1,186.2 (	Indo-Ch	ina 11.7)	1.1	192.3
India (British)	87.2	350.7	.....	41.0	.....	72,949.8	.....	3,511.7	450.0	2614.4
Ceylon	.....	.....	.....	.....	.....	343.6	.....	0.6	4.3	......
Japan	3.6	25.3	.....	89.5	.....	14,008.5	24.7	4.7	93.7	75.7
Korea*	.....	.....	.....	.....	.....	2,455.5	.....	38.0	29.7	......
Philippines	7.4	(16.0 P	ersia)	.....	.....	1,123.8	.....	......	63.9	170.4
Siam	.....	(3.50 T	urkey)	.....	.....	6,511.0	.....	5.4	......	......
Siberia	.....	54.7	72.3	6.0	23.6	....	27.8	......	......	......
Transcaucasia*	.....	0.1	0.1	..... (	Straits S	ettlements 123.2)	0.1	79.9	......	......
AUSTRALASIA	10.8	92.8	28.5	4.2	0.2	6.0	20.1	0.1	1.8	301.7
Australia	10.3	84.9	14.9	2.8	0.1	0.1	14.1	......	1.8	217.0
New South Wales	6.1	26.7	1.6	0.2	0.1	....	3.4	......	......	......
Queensland	3.3	1.3	.....	0.1	.....	....	0.5	0.1	......	......
South Australia	0.0	22.8	1.4	0.8	.....	....	0.8	......	......	......
Tasmania	.....	0.8	2.1	0.1	.....	....	3.0	......	......	......
Victoria	0.9	27.7	8.6	1.4	.....	....	6.0	......	......	......
West Australia	0.0	5.7	1.2	0.1	(Fiji	5.9)	0.3	......	(Fiji	84.6)
New Zealand	0.5	7.9	13.7	1.4	0.1	....	6.0	......	......	......
EUROPE	607.9	1805.5	2628.2	1060.2	1689.9	954.8	4905.4	0.9	595.1	7875.9
Austria*	14.5	61.1	143.4	72.0	112.8	....	456.5	......	14.2	1652.3[4]
Belgium	.....	14.6	40.9	4.2	22.7	....	107.0	......	20.7	276.1
Bosnia Herzegovina*	9.1	.....	5.0	3.5	0.4	....	3.4	......	9.8	[5]
Bulgaria*	28.2	43.7	9.9	12.4	8.6	7.8	0.4	0.9	15.2	7.7
Croatia Slavonia*	24.9	7.2	5.2	2.5	2.2	....	22.3	......	0.1	......
Denmark	.....	4.9	43.1	22.6	18.1	....	32.4	......	0.2	127.6
England	.....	56.4	74.8	47.4	.....	....	94.5	......	......	......
Finland*	.....	0.1	22.0	5.7	11.2	....	21.0	......	......	......
France*	22.2	317.3	310.0	46.5	48.6	2.0	489.4	......	45.3	759.4
Germany*	.....	152.1	592.0	153.5	445.2	....	1682.0	......	66.5	2429.1
Greece	.....	.....	.....	.....	.....	....	......	......	......	......
Hungary proper	168.1	156.5	85.8	69.8	48.7	....	108.1	......	143.1	[5]
Ireland	.....	1.6	63.1	7.5	.....	....	119.9	......	......	......
Italy	100.3	183.3	36.9	10.1	5.3	646.5	60.8	......	22.1	208.7
Netherlands	.....	5.0	18.5	3.3	16.4	....	110.2	......	1.8	246.3
North Caucasia*	13.7	.....	29.6	67.2	7.4	1.0	15.7	......	55.8	......
Norway	.....	0.3	10.2	2.9	1.0	....	24.8	......	......	......
Poland*	.....	23.3	76.6	27.2	90.5	....	373.9	......	......	......
Portugal	15.0	8.7	.....	.....	.....	....	......	......	......	......
Rumania*	100.6	86.7	27.5	24.8	4.7	....	4.8	......	16.4	39.2
Russia proper*	56.6	522.8	874.9	372.9	791.3	....	862.8	......	177.1	1828.0

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* Old boundaries.

[1] Average 1909–1910 and 1913–1914.

[2] Java and Madura.

[3] Java.

[4] Old Austria-Hungary.

[5] Included with Austria.

TABLE 11.—*Continued*

Continent and Country.	A. Corn, Millions of Bushels.	B. Wheat, Millions of Bushels.	C. Oats, Millions of Bushels.	D. Barley, Millions of Bushels.	E. Rye, Millions of Bushels.	F. Rice, Millions of Pounds.	G. Potatoes, Millions of Bushels.	H. Cotton, Thousands of Bales.	I. Tobacco, Millions of Pounds.	J. Sugar, Thousands of Short Tons.
EUROPE—*Continued*										
Scotland	.....	2.3	37.7	7.1	.....	....	34.7	......	......	......
Serbia	28.1	14.8	5.4	5.1	1.5	....	2.2	......	4.0	10.5
Spain	26.5	130.4	29.1	74.7	27.6	297.5	93.4	......	......	132.8
Sweden	.....	7.9	79.1	14.6	23.9	....	60.3	......	1.7	153.6
Switzerland	.....	3.3	.....	.....	.....	....	40.5	......	1.4	4.4
United Kingdom	.....	61.5	182.8	64.8	1.8	....	254.4	......	......	......
Wales	.....	1.1	7.3	2.8	.....	....	5.4	......	......	......
NORTH AMERICA	2891.2	893.8	1498.9	237.1	37.1	888.3	437.5	13,034.7	1146.0	4686.0
Canada	18.2	197.1	367.7	48.5	2.1	....	78.5	......	14.6	11.5
Alberta	.....	24.8	52.0	5.4	0.2	....	3.9	(British	W. Indi	es134.1)
Manitoba	.....	53.2	54.2	16.0	0.1	....	4.8	......	......	......
New Brunswick	.....	.....	5.9	0.1	.....	....	8.9	......	......	......
Nova Scotia	.....	.....	.....	.....	.....	....	6.6	......	......	......
Ontario	17.4	18.6	105.0	17.0	1.4	....	20.7	......	8.4	......
Prince Edward Island	.....	.....	.....	.....	.....	....	5.9	......	......	......
Quebec	0.7	1.2	40.3	2.4	0.2	....	19.7	......	6.3	......
Saskatchewan	.....	98.0	98.5	7.4	0.1	....	4.8	......	......	......
Costa Rica	.....	.....	.....	.....	(Briti	sh Colum	bia 3.1)	......	.....	2.9
Cuba	.....	.....	.....	.....	(Newf	oundland	1.5)	......	57.5	2295.4
Dominican Republic	.....	.....	.....	.....	.....	....	.....	1.1	29.2	106.5
Guatemala	.....	.....	.....	.....	.....	2.7	.....	......	0.7	8.3
Hawaii	.....	.....	.....	.....	.....	25.8	(Jamaic	a 0.1	0.4)	567.5
Mexico	164.7	10.0	.....	6.7	0.1	164.3	0.9	......	34.7	163.0
Porto Rico	.....	.....	.....	.....	.....	4.3	.....	0.4	12.7	363.5
United States	2708.3	686.7	1131.2	181.9	34.9	681.2	356.6	13,033.1	996.2	920.4
SOUTH AMERICA	182.0	185.0	55.9	7.6	1.1	296.5	48.2	370.1	107.4	562.9
Argentina	174.5	157.3	52.1	3.6	0.9	24.1	40.2	2.6	28.6	193.9
Brazil (Sao Paulo)	.....	.....	.....	.....	.....	99.5	.....	290.4	60.0	38.3
Chile	1.4	20.3	2.9	3.9	0.1	....	8.0	......	3.4	......
Guiana (British)	.....	.....	.....	.....	.....	69.1	.....	......	.....	106.2
Guiana (Dutch)	.....	.....	.....	.....	.....	2.8	.....	(Urugua	y 2.4)	12.6
Paraguay	.....	.....	.....	.....	.....	....	.....	......	13.0	1.4
Peru	(6.0	7.3	0.8	0.1	Urugua	y) 101.0	.....	87.1	.....	210.6

TABLE 12.—WORLD. PRODUCTION OF CHIEF CROPS PER THOUSAND PEOPLE

Source: D.

(Averages 1909–1913)

Continent and Country.	A. Corn. Bu.	B. Wheat. Bu.	C. Oats. Bu.	D. Barley. Bu.	E. Rye. Bu.	F. Rice. Lbs.	G. Potatoes. Bu.	H. Cotton. Bales.	I. Tobacco. Lbs.	J. Sugar. Short Tons.
AFRICA:										
Algeria	82	5,860	2,310	7,450	....	.....	320	....	4,250	......
Egypt	5,700	3,000	.....	....	....	48,500	....	128.0	....	5.9
Madagascar	....	.....	.....	....	....	310,000	(Ugan	da 6.1)	(Mauri	tius 6.2)
Nyasaland	....	.....	.....	....	....	2,080	....	3.8	2,260	......
Tunis	....	3,110	2,230	4,150	....	.....	....	.....	155	......
Union of S. Africa	4,440	770	1,200	335	....	.....	550	....	2,300	21.7
ASIA:										
Central Asia (Transcaspia, Turkestan)*	....	4,450	2,280	775	150	57,500	790	1.0	4,700	......
Cyprus	....	800	1,400	770	(Mala	y States				
						77,500)	....	23.0	......	......
Dutch E. Indies	....	.....	.....	....	....	264,000[2]	....	0.4	4,300	40.0[3]
Formosa	....	60	.....	30	....	340,000	(Fr. In	do		
							Chi	na 0.6)	320	55.5
India (British)	280	1,100	.....	130	....	230,000	....	11.2	1,700	8.3
Ceylon	....	.....	.....	....	....	95,500	....	0.2	1,230	......
Japan	70	480	.....	1,680	....	191,000	470	0.1	1,790	1.4

See Notes on Table 10.

TABLE 12.—*Continued*

Continent and Country.	A. Corn. Bu.	B. Wheat. Bu.	C. Oats. Bu.	D. Barley. Bu.	E. Rye. Bu.	F. Rice. Lbs.	G. Potatoes. Bu.	H. Cotton. Bales.	I. Tobacco. Lbs.	J. Sugar, Short Tons.
ASIA—*Continued*										
Korea*	....	.....	.....	....	....	166,000	....	2.6	2,000	......
Philippines	83	(1,400	Turkey*	)....	....	133,000	....	....	750	20.0
Siam	(Persia	1,700	).....	....	....	650,000	....	0.7	....	......
Siberia	....	5,600	7,400	610	240	.....	2,840	....	....	......
Transcaucasia*	....	80	80	....(	Straits	Settle-	80	6.5	....	......
					ments	173,000				
AUSTRALIA:										
New South Wales	3,700	16,200	950	120	60	.....	2,000	....	....	......
Queensland	5,400	2,150	.....	165	....	.....	825	0.2	....	......
South Australia	....	56,800	3,400	1,960	....	.....	1,960	....	....	......
Tasmania	....	4,200	11,000	520	....	.....	15,700	....	....	......
Victoria	675	21,000	8,550	1,060	....	.....	4,560	....	....	......
West Australia	....	20,200	4,250	335	(Fiji	42,300	) 1,065	....	....	......
New Zealand	490	7,500	13,000	1,330	95	.....	5,700	....	....	......
EUROPE:										
Austria*	500	2,100	4,950	2,480	3,900	.....	15,750	....	490	32.0[4]
Belgium	....	1,920	5,380	550	3,000	.....	14,100	....	3,220	36.4
Bosnia-Herzegovina*	5,260	.....	2,640	1,850	210	.....	1,800	....	5,150	[5]
Bulgaria*	6,400	9,900	2,250	2,810	1950	1,770	90	0.2	3,440	1.8
Croatia-Slavonia	*9.600	2,700	2,000	460	850	.....	8,550	.....	38	.....
Denmark	....	1,760	15,500	8,150	6500	.....	11,700	....	72	46.0
England	....	1,620	2,200	1,390	....	.....	2,770	....	....	.....
Finland*	....	32	7,000	1,810	3560	.....	6,700	....	....	.....
France	565	8,000	7,820	1,175	1230	50	12,350	....	1145	19.2
Germany*	....	2,300	8,960	2,320	6750	.....	25,500	....	995	36.8
Hungary	8,000	7,440	4,070	3,320	2310	.....	5,140	....	6,800	[5]
Ireland	....	365	14,400	1,710	....	.....	27,250	....	....	.....
Italy	2,890	5,290	1,060	290	152	18,600	1,750	....	635	6.0
Netherlands	....	815	3,010	537	2670	.....	17,920	....	293	40.0
North Caucasia*	2,390	.....	5,170	11,720	1295	175	2,740	....	975	......
Norway	....	125	425	1,210	418	.....	1,035	....	....	......
Poland*	....	1,900	6,250	2,220	7380	.....	30,500	....	....	......
Portugal	2,760	1,600	.....	....	....	.....	....	....	....	......
Rumania	13,800	11,950	3,800	3,420	650	.....	665	....	2,260	5.4
Russia proper*	440	4,060	6,770	2,900	6050	.....	6,700	....	1,375	14.2
Scotland*	....	482	7,900	1,490	....	.....	7,270	....	....	......
Serbia	9,500	5,000	1,830	1,725	505	.....	740	....	1,350	3.6
Spain	1,330	6,520	1,460	3,740	1380	14,900	4,680	....	....	6.7
Sweden	....	1,410	14,100	2,600	4250	.....	10,750	....	310	27.4
Switzerland	....	870	.....	....	....	.....	10,700	....	370	1.2
Wales	....	1,100	7,300	2,800	....	.....	5,400	....	....	......
NORTH AMERICA:										
Canada	2,440	26,350	49,200	6,500	208	.....	10,500	....	1,950	1.5
Alberta	....	6,600	139,000	14,400	535	.....	10,400	(Brit.	W. Ind	ies 76.5)
Manitoba	....	116,800	119,000	35,100	220	.....	....	10,500	....	......
N. Brunswick	....	.....	1,680	284	....	.....	2,550	....	....	......
Nova Scotia	....	.....	.....	....	....	.....	1,350	....	....	......
Ontario	6,900	7,370	41,700	6,750	550	.....	8,200	....	3,330	......
Pr. Edward Is.	....	.....	.....	....	....	.....	6,280	....	....	......
Quebec	350	600	2,020	1,200	200	.....	9,850	....	3,150	......
Saskatchewan	....	199,000	200,000	15,200	230	.....	9,750	....	....	......
Costa Rica	....	.....	.....	....	(Britis	h Col.	7,900)	....	....	7.5
Cuba	....	.....	.....	....	(Newf	oundlan	d 6,150	)....	23,200	926.0
Dominican Rep.	....	.....	.....	....	....	.....	....	1.5	40,200	147.0
Guatemala	....	.....	.....	....	.....	1,275	....	....	330	3.9
Hawaii	....	.....	.....	....	....	124,000	....	....	3,370	2725.0
Jamaica	....	.....	.....	....	....	.....	....	0.1	460	......
Mexico	10,850	.....	.....	440	....	10,830	60	....	2,285	10.8
Porto Rico	....	.....	.....	....	....	3,680	....	0.3	10,900	310.0
United States	27,400	6,950	11,450	1,840	350	6,890	3,610	132.0	10,100	9.3
SOUTH AMERICA:										
Argentina	20,000	18,100	6,000	415	103	2,770	4,620	0.3	3,280	22.2
Brazil (Sao Paulo)	....	.....	.....	....	....	4,140	....	12.1	2,500	1.6
Chile	405	58,500	840	1,125	290	.....	2,310	....	980	......
Guiana (British)	....	.....	.....	....	....	23,400	....	....	....	358.0
Guiana (Dutch)	....	.....	.....	....	....	32,600	....	....	....	140.6
Paraguay	....	.....	.....	....	....	.....	....	....	16,300	1.8
Peru	(4,900	5,950	650	80	Urugua	y)17,400	....	15.0	1,950	36.2

See Notes on Table 10.

TABLE 13.—WORLD. YIELD OF CHIEF CROPS PER ACRE, 1909–1913

Source: D.

	Continent and Country.	A. Corn. Bu.	B. Wheat. Bu.	C. Oats. Bu.	D. Barley. Bu.	E. Rye. Bu.	F. Rice. Lbs.	G. Potatoes. Bu.	H. Cotton. Bales.	I. Tobacco. Lbs.	J. Est. Prod. per U. S. Dept. of Ag. †
AFRICA	Algeria	14	10	28	12	...	...	40	...	1040	60
	Egypt	35	26	...	31[2]	...	2300	...	0.81	....	149
	Nyasaland	...	....	...	...	...	...	...	0.17	345	34[3]
	Tunis	...	5	31	7	...	...	...	...	....	....
	Union of S. Africa	...	7	47[1]	18[3]	...	...	53	...	725	....
ASIA	Central Asia (Transcaspia, Turkestan*)	...	8	16	14	6	615	53	0.59	835	....
	Dutch East Indies	...	....	...	...	...	1220	...	...	850	....
	Formosa	...	12	...	11	...	990	...	...	....	....
	India (British)	14	12	...	5	...	1030	...	0.16	440	78
	Ceylon	...	....	...	...	...	485	...	1.13	305	....
	Japan	28	21	...	28	...	1900	142	0.72	1300	127
	Korea (Chosen)	...	13	...	23	...	1015	...	0.29	645	....
	Malay States	...	....	...	...	...	640	...	...	....	....
	Philippines	8	....	...	...	...	505	...	...	410	....
	Siam	...	....	...	...	...	1235	...	...	....	....
	Siberia	...	9	18	13	10	...	93	...	....	66
	Straits Settlements	...	....	...	...	...	1340	...	...	....	....
	Transcaucasia	...	11	27	13	8	...	74	0.32	....	....
AUSTRALASIA	Australia	...	....	...	...	...	...	...	...	950	70
	New South Wales	32	13	21	17	12	...	86	...	....	....
	Queensland	23	13	24	17	...	...	65	0.17	....	....
	South Australia	...	11	14	18	10	...	112	...	....	....
	Tasmania	...	22	55	31	18	...	124	...	....	....
	Victoria	49	13	22	23	12	...	109	...	....	....
	West Australia	...	10	15	12	5	...	103	...	....	....
	New Zealand	...	31	36	36	19	...	216	...	....	155
	Fiji	...	....	...	...	...	495	...	0.25	....	....
EUROPE	Austria*	19	20	31	26	22	...	147	...	1570	111
	Belgium	...	37	63	50	35	...	275	...	2075	204
	Bosnia-Herzegovina*	16	....	22	16	11	...	49	...	....	....
	Bulgaria*	18	16	22	20	16	1110	57	0.48	635	81
	Croatia-Slavonia*	24	....	21	16	12	...	115	...	....	....
	Denmark	...	40	42	38	29	...	224	...	....	156
	England	...	32	41	34	...	...	232	...	....	....
	Finland*	...	....	22	...	19	...	114	...	....	....
	France*	20	19	32	25	16	...	127	...	1160	114
	Germany*	...	32	55	39	29	...	204	...	1710	157
	Greece	...	8	...	19	14[4]	...	...	...	....	....
	Hungary proper	28	19	32	25	19	...	119	...	1190	105
	Ireland	...	37	60	45	...	...	203	...	....	....
	Italy	25	16	32	16	18	1790	92	...	1116	89
	Netherlands	...	36	54	48	30	...	266	...	....	176
	North Caucasia*	18	....	25	18	14	525	80	...	870	....
	Norway	...	26	39	32	26	...	244	...	....	....
	Poland*	...	19	27	22	17	...	142	...	....	118
	Portugal	...	7	...	...	...	...	...	...	....	68
	Rumania*	19	19	25	19	15	...	130	...	660	87
	Russia proper	18	10	23	16	12	...	104	...	1630	67
	Scotland	...	45	40	37	...	...	239	...	....	....
	Serbia	19	17	20	21	13	...	73	...	800	70
	Spain	23	14	23	21	14	4180	136	...	....	86
	Sweden	...	31	40	32	24	...	159	...	....	126
	Switzerland	...	21	59	...	30	...	218	...	....	187
	United Kingdom	...	....	...	...	29	...	...	...	....	164
	Wales	...	25	35	32	...	...	208	...	....	....
NORTH AMERICA	British West Indies	...	....	...	...	...	...	...	0.23	....	....
CANADA	Alberta	...	21	43	29	25	...	164	...	....	126
	British Columbia	...	....	...	...	...	...	224	...	....	
	Manitoba	...	....	39	28	19	...	183	...	....	
	New Brunswick	...	....	29	26	...	...	212	...	....	
	Nova Scotia	...	....	...	...	...	...	207	...	....	
	Ontario	60	22	36	29	18	...	133	...	2095	
	Prince Edward Is.	...	....	...	...	...	...	184	...	....	
	Quebec	31	17	28	24	17	...	165	...	626	
	Saskatchewan	...	20	43	31	18	...	166	...	....	
	Hawaii	...	....	...	...	...	2875	...	...	....	....
	Mexico	16	4	...	...	...	1020	...	0.82	....	48
	Newfoundland	...	....	...	...	...	...	...	...	....	...
	Porto Rico	...	....	...	...	...	268	...	...	705	....
	United States	27	15	30	24	16	913	97	0.36	870	100
	SOUTH AMERICA:										
	Argentina	21	10	26	...	14	1205	171	0.49	1190	69
	Brazil (Sao Paulo)	...	....	...	...	...	435	...	...	....	....
	Chile	25	20	43	...	24	...	122	...	2480[5]	126
	Guiana (British)	...	....	...	...	...	1825	...	...	....	....
	Peru	...	....	...	...	...	730	...	...	....	....
	Uruguay	11	10	18	...	...	...	...	...	590[5]	65

[1] 1917–1920. [2] 1914–1920. [3] 1916–1920. [4] 1914–1919. [5] 1917–1918.

* Old boundaries. † See Note on next page.

TABLE 14.—WORLD. TOTAL NUMBER OF ANIMALS

Source: A.

Continent and Country.	Year.	A. Horses. Thousands.	B. Asses and Mules. Thousands.	C. Cattle. Thousands.	D. Sheep. Thousands.	E. Goats. Thousands.	F. Swine. Thousands.
AFRICA:							
Algeria	1913	216	464	1,108	8,811	3,848	112
Basutoland	1911	88	....	437	1,369	....	....
Bechuanaland	1911	1	3	324	358*	....	....
Egypt	1914	40	655	601	816	331	....
Mauritius	1910	1	....	16	1	5	4
Nyasaland	1911	....	....	55	15	112	11
Tunis	1910	37	100	171	616	333	8
Union of South Africa	1911	714	431	5,797	30,657	11,763	1,082
ASIA:							
Asiatic Russia	1915	9,614	....	14,772	33,294*	....	2,243
India	1914	1,833	1755	161,410	26,466†	38,366†	....
Japan	1910	1,565	....	1,384	3	92	279
Turkey	1912	....	....	....	27,095	20,269	73
AUSTRALASIA:							
Australia	1915	2,379	10	9,931	69,245	223	753
New Zealand	1916	371	....	2,417	24,788	18	298
EUROPE:							
Austria	1910	1,803	64	9,160	2,428	1,257	6,432
Belgium	1910	317	11	1,880	185	218	1,494
Bulgaria	1910	478	130	1,603	8,632	1,459	527
Denmark	1914	567	....	2,463	515	41	2,497
France	1914	2,205	488	12,668	14,038	1,317	5,926
Germany	1912	4,523	13	20,182	5,803	3,410	21,924
Great Britain and Ireland	1910	2,095	272	11,765	31,165	243	3,561
Greece	1911	149	212	298	3,545	2,638	227
Hungary	1911	2,007	19	6,028	7,697	331	6,415
Italy	1914	981†	1254†	6,626†	11,143†	2,705†	2,722
Netherlands	1910	327	....	2,027	889	224	1,260
Norway	1910	168	....	1,134	1,398	288	334
Portugal	1906	88	202	703	3,073	1,034	1,111
Rumania	1911	825	4	2,617†	5,269	187	1,021
Russia (omitting Finland)	1914	25,292	....	37,485	41,611†	1,500†	12,903
Serbia	1910	153	2	957	3,819	631	866
Spain	1911	546	1741	2,541	15,726	3,370	2,472
Sweden	1910	587	....	2,748	1,004	69	957
Switzerland	1911	144	5	1,443	161	341	570
NORTH AMERICA:							
Canada	1914	2,948	....	6,037	2,058	....	3,434
Costa Rica	1910	60	3	333	1	1	70
Cuba	1910	613	64	3,212	....	....	....
Mexico	1902	859	622	5,142	3,424	4,206	616
Nicaragua	1908	28	7	252	....	1	12
United States (exclud. Alaska)	1921	20,183	4999	66,191	45,067	3,030	66,649
SOUTH AMERICA:							
Argentina	1913	9,366	929	30,796	81,485	4,564	3,197
Brazil	1912	7,290	3208	30,705	10,550	10,049	18,401
Chile	1912	421	70	1,760	4,169	273	166
Uruguay	1908	556	22	8,193	26,286	20	180

* Includes goats.
† Approximate.
‡ 1911.

Note on Table 13 J. In computing the productivity, or crop yield, the Department of Agriculture first obtains the average yield per acre of the chief crops for a series of years. It then reduces these yields to percentages of the standard for the crop in question, and averages these percentages, giving each crop a weight proportional to its importance in the given country. The United States, with a productivity of 100, is reckoned as the standard. See Table 24.

TABLE 15.—WORLD. ANIMALS PER SQUARE MILE AND ANIMALS PER THOUSAND PEOPLE

Source: A.

Continent and Country.	Animals per Square Mile.						Animals per Thousand People.					
	A Horses.	B Asses and Mules.	C Cattle.	D Sheep.	E Goats.	F Swine.	A′ Horses.	B′ Asses and Mules.	C′ Cattle.	D′ Sheep.	E′ Goats.	F′ Swine.
Africa:												
Algeria	1.0	2.1	5.0	40	17	0.5	38	183	199	1,580	690	20
Basutoland	7.5	.....	3.7	117	.....	.....	216	.....	1080	3,370	.....	....
Bechuanaland	....	0.1	6.3	7*	.....	.....	8	24	2600	3,860*	.....	....
Egypt	0.1	1.7	1.6	2	1	.....	3	54	49	67	28	....
Mauritius	1.0	.....	22.2	1	7	5.5	3	.....	42	3	13	10
Nyasaland	....	.....	1.4	0.4	3	0.3	.....	.....	51	14	103	10
Tunis	0.8	2.1	3.5	16	7	0.2	19	52	89	318	172	4
Union of S. Africa	1.5	0.9	12.2	63	23	2.3	110	67	895	4,750	1820	168
Asia:												
Asiatic Russia	1.5	.....	2.3	5*	.....	3.6	338	.....	517	1,170*	.....	79
India (British provinces)	1.0	1.0	89.0	15†	21†	.....	6	6	514	83†	122†	....
Japan	10.6	.....	9.4	.....	1	1.9	28	.....	25	.....	2	5
Turkey	....	.....	......	39	29	0.1	.....	.....	.....	1,270	950	3
Australasia:												
Australia	0.8	.....	3.4	23	.....	0.3	482	2	2020	14,100	45	153
New Zealand	0.4	.....	2.4	24	.....	0.3	327	.....	2190	22,400	16	271
Europe:												
Austria	15.6	0.6	79.2	21	11	55.5	58	2	296	78	41	208
Belgium	27.8	1.0	165.0	16	19	131.0	41	14	246	24	28	195
Bulgaria	10.0	2.7	33.4	180	30	11.0	101	27	337	1,815	306	111
Denmark	37.8	.....	164.0	34	4	166.0	196	.....	850	178	14	890
France	10.3	2.3	59.5	66	6	27.8	56	12	320	370	33	149
Germany	26.2	0.1	117.0	34	20	127.0	67	.....	297	86	50	323
Great Britain and Ireland	17.3	2.2	97.0	257	2	29.4	45	6	253	670	5	765
Greece	6.0	8.1	12.0	143	106	9.1	56	80	112	1,335	980	85
Hungary	15.9	0.2	48.0	64	3	51.0	83	1	280	370	15	300
Italy	8.9	11.3†	60.0†	100†	24†	24.6	37	35†	183†	309†	75†	76
Netherlands	24.8	.....	154.0	67	17	96.0	51	.....	320	140	35	199
Norway	1.4	.....	9.0	11	2	2.7	66	.....	455	512	116	134
Portugal	2.5	5.7	19.8	87	29	31.3	15	34	117	515	174	186
Rumania	16.3	0.1	51.5†	104	4	20.2	110	1	348†	701	25	136
Russia (omitting Finland)	12.7	.....	18.3	21†	1†	6.5	172	.....	255	384†	10†	82
Serbia	8.2	0.1	51.8	205	34	46.5	33	.....	208	828	136	188
Spain	2.8	9.0	13.1	81	17	12.7	27	85	125	770	166	121
Sweden	3.4	.....	16.2	6	.....	5.5	103	.....	485	177	12	168
Switzerland	9.0	0.3	90.5	10	21	35.7	37	1	370	41	88	146
North America:												
Canada	0.8	.....	1.6	1	.....	1.0	620	.....	1270	432	.....	720
Costa Rica	3.2	0.2	17.8	.....	.....	3.8	142	7	795	2	2	166
Cuba	13.4	1.4	70.5	.....	.....	.....	244	25	1280	.....	.....	....
Mexico	1.1	0.9	7.7	5	6	0.9	55	40	331	220	371	40
Nicaragua	0.6	0.1	5.1	.....	.....	0.2	40	10	358	.....	1	17
United States	6.8	1.7	22.3	15	1	22.4	189	47	621	423	28	626
South America:												
Argentina	8.2	0.8	27.0	72	4	2.7	1,185	118	3,920	10,370	580	406
Brazil	2.2	2.0	9.1	3	3	5.6	296	131	1,250	428	408	747
Chile	1.4	0.2	6.1	14	1	0.6	117	19	490	1,160	41	46
Uruguay	7.7	0.3	114.0	364	0.3	2.5	421	17	6,200	19,920	15	136

* Includes goats.
† Approximate.

TABLE 16.—UNITED STATES. ANNUAL YIELD OF CHIEF CROPS, 1919

Source: D.

State.	A. Wheat. Thousands of Bushels.	B. Barley. Thousands of Bushels.	C. Oats. Thousands of Bushels.	D. Corn. Thousands of Bushels.	E. Potatoes. Thousands of Bushels.	F. Tobacco. Thousands of Pounds.	G. Cotton. Thousands of Bales.	H. Hay. Thousands of Tons.
Alabama	1,242	....	6,696	62,843	3,520	1,890	715	1367
Arizona	1,204	1,102	533	1,287	350	....	75	676
Arkansas	3,230	....	9,240	48,726	3,321	456	830	770
California	16,335	30,000	5,250	2,871	11,352	....	102	4257
Colorado	17,645	3,900	6,524	11,206	11,040	....	....	2396
Connecticut	....	....	620	3,300	1,680	39,000	....	544
Delaware	1,740	....	115	6,900	913	....	....	105
Florida	....	....	1,140	12,600	1,824	3,990	17	141
Georgia	2,520	....	10,800	69,890	1,610	16,430	1730	613
Idaho	18,705	3,360	7,700	840	5,400	....	....	1625
Illinois	65,675	5,724	123,060	301,000	8,060	525	....	4810
Indiana	46,020	1,430	60,225	175,750	4,400	15,215	....	3080
Iowa	23,675	8,032	196,182	416,000	4,945	....	....	5181
Kansas	151,001	16,200	44,229	69,362	5,168	....	....	4507
Kentucky	12,029	100	9,900	82,500	5,040	456,500	....	1561
Louisiana	....	....	1,650	32,375	1,600	174	300	450
Maine	228	168	5,746	1,100	24,480	....	....	1456
Maryland	10,665	198	1,820	28,413	5,170	19,575	....	630
Massachusetts	....	....	570	2,640	2,970	15,400	....	656
Michigan	20,237	5,320	36,875	64,350	28,688	....	....	3180
Minnesota	37,710	18,200	90,160	118,000	26,100	....	....	3800
Mississippi	504	....	5,282	59,700	1,530	....	946	648
Missouri	57,886	330	38,259	155,412	8,250	3,500	60	3794
Montana	10,729	540	6,120	1,728	2,820	....	....	827
Nebraska	60,675	5,577	69,962	184,186	6,325	....	....	4299
Nevada	668	420	384	90	900	....	....	526
New Hampshire	....	25	1,221	1,050	2,400	....	....	675
New Jersey	1,962	....	2,460	10,800	10,560	....	....	488
New Mexico	6,100	680	2,340	7,200	495	....	....	646
New York	11,178	2,486	29,580	35,260	39,567	3,483	....	6579
North Carolina	7,225	....	3,767	55,100	4,930	310,240	875	1040
North Dakota	53,613	14,950	38,400	16,764	5,670	....	....	908
Ohio	54,440	3,150	51,858	162,800	9,300	77,400	....	3973
Oklahoma	52,640	1,500	49,500	74,400	3,520	....	930	1540
Oregon	20,495	1,886	11,104	1,860	4,230	....	....	1452
Pennsylvania	29,055	392	36,859	72,192	25,400	54,120	....	4318
Rhode Island	....	....	68	495	425	....	....	86
South Carolina	1,836	....	11,730	37,440	2,295	81,000	1475	358
South Dakota	30,175	19,250	53,650	91,200	4,500	....	....	1558
Tennessee	7,290	176	9,200	74,750	3,120	88,000	298	1792
Texas	31,350	875	94,500	202,800	3,796	....	2700	1258
Utah	3,682	720	2,448	432	2,397	....	....	938
Vermont	252	420	3,960	2,120	3,125	....	....	1456
Virginia	12,508	375	5,280	44,800	11,495	131,100	22	1650
Washington	40,100	4,140	12,800	1,620	7,250	....	....	1906
West Virginia	5,400	....	4,750	24,990	5,130	10,500	....	1215
Wisconsin	7,355	13,568	78,123	85,540	28,200	60,960	....	4738
Wyoming	4,008	525	5,670	768	2,640	....	....	853

TABLE 17.—UNITED STATES. YIELD OF CROPS PER ACRE

(10-year average, 1910–1919)

Source: D.

State.	A. Wheat. Bushels.	B. Barley. Bushels.	C. Oats. Bushels.	D. Corn. Bushels.	E. Potatoes. Bushels.	F. Tobacco. Pounds.	G. Cotton. Pounds of Lint.	H. Hay. Tons.
Alabama	10.8	....	19.2	16.2	80	621	156	1.19
Arizona	27.9	36.6	40.7	31.2	97	....	292	3.43
Arkansas	11.8	....	24.1	19.7	71	623	183	1.30
California	16.7	28.7	33.9	35.2	134	....	376	1.72
Colorado	20.1	31.0	35.8	18.6	118	....	....	2.18
Connecticut	....	....	32.4	48.9	101	1582	....	1.33
Delaware	15.8	....	30.5	32.8	88	....	....	1.25
Florida	....	....	16.9	14.8	85	959	116	1.25
Georgia	10.8	....	19.8	15.0	72	880	189	1.25
Idaho	24.7	36.3	42.5	33.4	160	....	....	2.82
Illinois	16.3	31.2	37.3	34.2	71	769	....	1.24
Indiana	15.9	28.2	34.1	36.3	74	874	....	1.28
Iowa	18.5	28.6	37.6	36.3	75	....	....	1.37
Kansas	13.8	17.3	26.4	15.5	60	....	....	16.1
Kentucky	12.2	27.1	23.1	27.1	78	854	....	1.21
Louisiana	....	....	22.2	19.4	66	422	162	1.62
Maine	23.7	27.0	37.6	43.5	203	....	....	1.21
Maryland	16.1	29.8	29.8	36.6	88	743	....	1.27
Massachusetts	....	....	36.0	46.8	116	1558	....	1.35
Michigan	17.1	25.4	33.4	31.9	90	....	....	1.30
Minnesota	14.1	24.3	33.4	34.2	100	....	....	1.55
Mississippi	14.6	....	19.6	18.2	82	....	171	1.42
Missouri	14.3	24.3	27.1	26.2	66	939	258	1.07
Montana	19.2	26.6	36.4	23.4	128	....	....	1.74
Nebraska	16.0	21.9	28.5	23.7	72	....	....	1.64
Nevada	27.6	40.2	42.3	32.2	167	....	....	2.90
New Hampshire	....	27.8	37.7	44.6	128	....	....	1.21
New Jersey	18.4	....	31.8	39.0	104	....	....	1.41
New Mexico	19.9	30.2	32.8	23.9	86	....	....	2.27
New York	20.8	27.1	32.8	36.5	94	1242	....	1.31
North Carolina	10.2	....	17.6	19.4	81	632	254	1.31
North Dakota	10.5	18.7	24.2	22.4	87	....	....	1.23
Ohio	17.0	28.4	36.4	38.6	78	896	....	1.34
Oklahoma	12.6	19.8	23.6	14.8	59	....	165	1.41
Oregon	20.2	31.8	35.9	30.0	120	....	....	2.04
Pennsylvania	17.4	26.8	33.2	41.3	86	1387	....	1.37
Rhode Island	....	....	31.3	41.0	119	....	....	1.25
South Carolina	10.7	....	20.3	17.7	84	676	227	1.19
South Dakota	11.4	22.3	29.3	27.7	80	....	....	1.45
Tennessee	10.9	23.7	22.7	25.3	72	773	193	1.29
Texas	13.5	24.3	30.0	18.8	59	....	155	1.33
Utah	21.8	38.8	4.44	30.2	160	....	....	2.54
Vermont	25.4	31.6	38.9	43.3	124	....	....	1.42
Virginia	12.8	26.8	21.9	26.0	93	707	253	1.17
Washington	20.4	34.6	44.5	31.4	139	....	....	2.23
West Virginia	13.8	....	25.0	30.4	88	764	....	1.25
Wisconsin	19.3	29.3	36.8	35.4	102	1172	....	1.55
Wyoming	23.6	31.8	35.3	21.0	120	....	....	1.98

TABLE 18.—UNITED STATES. YIELD OF CHIEF CROPS PER CAPITA, 1919

Source: D.

State.	A. Wheat. Bushels.	B. Barley. Bushels.	C. Oats. Bushels.	D. Corn. Bushels.	E. Potatoes. Bushels.	F. Tobacco. Pounds.	G. Cotton. Bales.	H. Hay. Tons.
Alabama	0.5	....	2.8	26.8	1.5	0.8	0.30	0.6
Arizona	3.6	3.3	1.6	3.8	1.0	....	0.22	2.0
Arkansas	1.8	....	5.3	27.8	1.9	0.3	0.47	0.4
California	4.8	8.8	1.5	0.8	3.3	....	0.30	1.2
Colorado	18.8	4.2	7.0	11.9	11.7	....	....	2.6
Connecticut	....	....	0.4	2.4	1.2	28.2	....	0.4
Delaware	7.8	....	0.5	31.0	4.1	....	....	0.5
Florida	....	....	1.2	13.0	1.9	4.1	0.02	0.1
Georgia	0.9	....	3.7	24.1	0.6	5.7	0.60	0.2
Idaho	43.4	7.8	17.8	1.9	12.5	....	....	3.8
Illinois	10.0	0.9	19.0	46.4	1.2	0.1	....	0.7
Indiana	15.7	0.5	20.5	59.6	1.5	5.2	....	1.1
Iowa	9.9	3.3	81.6	173.0	2.6	....	....	2.2
Kansas	85.6	9.1	25.0	38.2	2.9	....	....	2.5
Kentucky	5.0	....	4.1	34.2	2.1	189.0	....	0.6
Louisiana	....	....	0.9	18.1	0.9	0.1	0.17	0.3
Maine	0.3	0.2	7.5	1.4	31.8	....	....	1.9
Maryland	7.4	0.1	1.3	19.6	3.6	13.5	....	0.4
Massachusetts	....	....	0.1	0.7	0.8	4.0	....	0.2
Michigan	5.5	1.5	10.0	17.5	7.8	....	....	0.9
Minnesota	15.8	7.6	37.7	48.3	10.9	....	....	1.6
Mississippi	0.3	....	3.0	32.4	0.9	....	0.54	0.4
Missouri	17.0	0.1	11.2	45.2	2.4	1.0	....	1.1
Montana	19.6	1.0	11.1	3.2	5.1	....	....	1.5
Nebraska	46.8	4.3	53.9	142.0	4.9	....	....	3.3
Nevada	8.6	5.4	5.0	1.2	11.6	....	....	6.7
New Hampshire	....	0.1	2.7	2.4	5.4	....	....	1.5
New Jersey	0.6	....	0.8	3.4	3.3	....	....	0.2
New Mexico	17.0	1.9	6.5	20.0	1.4	....	....	1.8
New York	1.1	0.2	2.9	3.4	3.8	0.3	....	0.6
North Carolina	2.8	....	1.5	21.5	1.9	121.2	0.34	0.4
North Dakota	83.2	23.1	59.4	25.9	8.8	....	....	1.4
Ohio	9.4	0.6	9.0	27.2	1.6	13.4	....	0.7
Oklahoma	26.0	0.7	24.4	36.7	1.7	....	0.46	0.8
Oregon	26.2	2.4	14.2	23.8	5.3	....	....	1.9
Pennsylvania	3.3	....	4.2	7.2	2.9	6.2	....	0.5
Rhode Island	....	....	0.1	0.8	0.7	....	....	0.1
South Carolina	1.1	....	7.0	22.2	1.4	48.0	0.87	0.2
South Dakota	47.1	30.2	84.1	143.2	7.1	....	....	2.4
Tennessee	3.1	0.1	3.9	32.0	1.3	37.7	0.13	0.8
Texas	6.7	0.2	20.2	43.5	0.8	....	0.58	0.3
Utah	8.2	1.6	5.4	0.9	5.3	....	....	2.1
Vermont	0.7	1.2	11.2	6.0	8.9	....	....	4.1
Virginia	5.4	0.1	2.3	19.4	5.0	56.8	0.01	0.7
Washington	29.6	3.5	9.4	1.2	5.3	....	....	1.4
West Virginia	3.7	....	3.2	17.0	3.5	7.2	....	0.8
Wisconsin	2.8	3.7	29.6	32.4	10.7	23.1	....	1.7
Wyoming	20.4	2.7	29.2	4.0	13.6	....	....	4.4

TABLE 19.—UNITED STATES. FARM PRICE OF CROPS

(10-year average, 1910–1919)

Source: D.

State.	A. Wheat. Per Bushel. Cents.	B. Barley. Per Bushel, Cents.	C. Oats. Per Bushel, Cents.	D. Corn. Per Bushel, Cents.	E. Potatoes. Per Bushel, Cents.	F. Tobacco. Per Pound, Cents.	G. Cotton. Per Pound, Cents.	H. Hay. Per Ton, Dollars.
Alabama	166	....	78	100	134	28.0	17.5	15.28
Arizona	150	98	80	139	148	....	....	14.97
Arkansas	134	....	63	100	130	20.1	17.7	14.06
California	134	87	67	120	104	....	18.6	13.61
Colorado	122	76	57	87	86	....	....	11.54
Connecticut	....	....	64	117	120	27.3	....	21.68
Delaware	139	....	60	86	97	....	....	19.24
Florida	....	....	82	99	152	35.2	25.9	18.07
Georgia	175	....	83	108	138	30.8	17.9	18.46
Idaho	116	78	54	103	75	....	....	11.28
Illinois	134	81	47	76	109	12.5	....	15.46
Indiana	135	77	47	76	103	14.2	....	15.03
Iowa	126	76	44	72	100	....	....	12.14
Kansas	129	68	50	84	116	....	....	11.02
Kentucky	139	95	61	88	113	14.8	....	17.11
Louisiana	....	....	70	96	128	36.9	17.3	14.05
Maine	152	103	64	120	86	....	....	13.89
Maryland	139	84	59	87	89	14.5	....	18.36
Massachusetts	....	....	64	116	120	26.2	....	22.01
Michigan	136	82	49	92	77	....	....	15.47
Minnesota	134	74	44	72	72	....	....	9.42
Mississippi	161	....	75	97	126	....	18.1	13.75
Missouri	132	82	49	83	112	17.1	17.0	13.57
Montana	124	75	52	104	84	....	....	12.88
Nebraska	124	64	45	74	79	....	....	10.19
Nevada	132	98	74	123	96	....	....	12.08
New Hampshire	....	109	65	112	109	....	....	16.89
New Jersey	142	....	58	100	109	....	....	21.24
New Mexico	134	90	65	111	129	....	....	13.64
New York	140	94	58	110	96	14.1	....	16.00
North Carolina	154	....	75	113	108	22.0	17.4	18.08
North Dakota	130	66	43	84	79	....	....	8.30
Ohio	138	79	49	81	106	14.6	....	15.69
Oklahoma	128	84	53	88	137	....	16.8	10.67
Oregon	123	84	56	102	77	....	....	12.52
Pennsylvania	138	88	56	96	100	11.9	....	17.46
Rhode Island	....	....	64	130	122	....	....	22.76
South Carolina	178	....	82	123	149	15.4	17.8	19.67
South Dakota	128	72	43	71	87	....	....	7.87
Tennessee	143	105	63	90	111	12.0	17.3	17.83
Texas	139	94	58	99	147	....	17.3	13.72
Utah	120	82	61	108	82	....	....	11.98
Vermont	147	100	65	113	95	....	....	14.55
Virginia	143	95	67	101	98	17.8	17.5	18.16
Washington	122	79	58	108	78	....	....	15.27
West Virginia	144	....	64	106	109	19.0	....	18.18
Wisconsin	132	84	48	87	72	13.2	....	14.39
Wyoming	125	91	60	99	98	....	....	11.94

TABLE 20.—UNITED STATES. TOTAL NUMBER OF ANIMALS

(All numbers are given in thousands. 1920)

Source: B.

State.	A.	B.	C.	D.	E.	F.	G.	H.	I.
	Horses.	Mules.	Cattle.		Sheep.	Goats.	Swine.	Chickens.	Yearly Production of Eggs, Dozens.
			Dairy Cattle.	Beef Cattle.					
Alabama	130	296	722	322	82	104	1497	5,918	23,437
Arizona	136	12	54	768	882	161	50	495	2,525
Arkansas	252	323	727	346	100	124	1378	6,955	28,168
California	402	63	779	1229	2400	116	909	10,427	64,124
Colorado	421	31	322	1434	1813	29	450	2,875	14,172
Connecticut	38	1	163	11	11	...	61	1,120	6,341
Delaware	28	9	45	2	3	...	39	949	3,908
Florida	39	42	121	518	65	46	755	1,555	6,531
Georgia	101	406	675	482	72	110	2071	7,222	23,182
Idaho	293	8	202	513	2356	2	240	1,655	10,392
Illinois	1297	168	1505	1283	638	10	4639	25,121	105,758
Indiana	717	100	946	600	644	8	3757	16,754	83,101
Iowa	1387	82	1520	3048	1092	11	7864	27,747	120,697
Kansas	1083	243	930	2046	361	7	1733	16,919	76,137
Kentucky	382	293	660	434	708	35	1504	10,478	42,225
Louisiana	179	180	317	488	130	91	851	3,764	13,136
Maine	94	...	267	33	119	...	91	1,403	9,977
Maryland	141	33	230	54	130	1	306	3,436	15,086
Massachusetts	51	...	206	10	19	1	104	1,455	9,604
Michigan	606	6	1256	330	1209	2	1106	10,914	55,987
Minnesota	933	10	2081	941	509	3	2381	13,213	60,250
Mississippi	215	308	789	461	164	113	1373	6,342	23,783
Missouri	906	389	1067	1715	1272	121	3889	24,884	117,204
Montana	669	9	212	1057	2083	1	167	2,055	11,858
Nebraska	961	100	690	2465	573	2	3436	11,615	49,133
Nevada	50	2	24	332	881	1	27	155	895
New Hampshire	38	...	145	18	28	3	42	771	5,005
New Jersey	73	6	173	7	10	1	139	2,534	13,280
New Mexico	183	20	63	1238	1640	223	88	714	3,063
New York	536	7	2081	63	579	3	601	10,415	62,175
North Carolina	171	257	462	183	91	24	1271	7,393	24,841
North Dakota	856	8	660	675	299	1	458	4,329	20,821
Ohio	811	32	1349	577	2103	4	3084	20,233	102,377
Oklahoma	738	337	808	1265	105	46	1304	11,137	45,440
Oregon	272	14	280	571	2002	134	267	2,500	14,626
Pennsylvania	506	55	1316	230	509	3	1191	14,503	75,998
Rhode Island	7	...	29	2	3	...	13	254	1,537
South Carolina	78	220	316	118	24	32	845	3,954	12,812
South Dakota	817	15	546	1802	844	1	1954	6,642	30,352
Tennessee	318	353	669	492	364	73	1832	11,354	48,707
Texas	991	846	1464	4693	2573	1753	2226	18,063	64,979
Utah	125	3	108	398	1692	30	99	955	5,709
Vermont	77	1	421	14	63	...	73	800	5,167
Virginia	312	97	509	400	342	7	941	7,860	36,551
Washington	296	23	379	194	624	7	265	3,548	21,357
West Virginia	169	15	255	332	510	7	305	4,028	21,708
Wisconsin	683	4	2763	287	480	2	1596	11,495	53,222
Wyoming	198	3	58	817	1860	2	72	621	3,166

TABLE 21.—UNITED STATES. AVERAGE NUMBER OF ANIMALS PER SQUARE MILE

Source: B.

State.	A.	B.	C.	D.	E.	F.	G.	H.	I.
			Cattle.						Yearly Production of Eggs. Dozens.
	Horses.	Mules.	Dairy Cattle.	Beef Cattle.	Sheep.	Goats.	Swine.	Chickens.	
Alabama	3	6	14	6	2	2	29	115	458
Arizona	1	...	...	7	8	1	...	4	22
Arkansas	5	6	14	7	2	2	26	134	535
California	3	...	5	8	17	1	6	67	412
Colorado	4	...	3	14	17	...	4	28	136
Connecticut	8	...	34	2	2	...	13	232	1310
Delaware	14	5	23	1	2	...	20	482	1990
Florida	1	1	2	9	1	1	14	28	119
Georgia	2	7	12	8	1	2	35	123	395
Idaho	4	...	2	6	28	...	3	20	124
Illinois	23	3	27	23	11	...	83	446	1880
Indiana	20	3	26	17	18	..	104	463	2400
Iowa	25	1	27	55	20	...	142	493	2165
Kansas	13	3	11	25	4	...	21	207	930
Kentucky	10	7	16	11	17	1	37	261	1050
Louisiana	4	4	7	11	3	2	20	83	289
Maine	3	...	9	1	4	...	3	7	334
Maryland	14	3	23	5	10	...	30	346	1520
Massachusetts	6	...	26	1	2	...	13	181	1196
Michigan	11	...	22	6	21	...	19	190	975
Minnesota	12	...	26	12	6	...	30	164	748
Mississippi	5	7	17	10	4	2	30	137	513
Missouri	13	6	16	25	19	2	57	362	1705
Montana	5	...	1	7	14	...	1	14	81
Nebraska	13	1	9	32	7	...	45	151	640
Nevada	...	...	...	3	8	...	...	1	8
New Hampshire	4	...	16	2	3	...	5	85	554
New Jersey	10	1	23	1	1	...	19	336	1765
New Mexico	1	...	1	10	13	2	1	6	25
New York	11	...	44	1	12	...	13	219	1305
North Carolina	4	5	9	4	2	...	26	152	510
North Dakota	12	...	9	10	4	...	7	62	296
Ohio	20	1	33	14	52	...	76	492	2510
Oklahoma	11	5	12	18	2	1	19	212	861
Oregon	3	...	3	6	21	1	3	26	153
Pennsylvania	11	1	29	5	11	...	27	322	1695
Rhode Island	7	...	27	2	3	...	12	238	1440
South Carolina	3	7	10	4	1	1	28	129	420
South Dakota	11	...	7	23	11	...	25	86	394
Tennessee	8	8	16	12	9	2	44	272	1170
Texas	4	3	6	18	10	7	9	69	248
Utah	2	...	1	5	2	...	1	12	694
Vermont	8	...	46	2	7	...	8	88	566
Virginia	8	2	8	10	13	...	23	195	903
Washington	4	...	6	3	9	...	4	53	320
West Virginia	7	1	11	14	21	...	13	168	902
Wisconsin	12	...	50	5	9	...	29	208	960
Wyoming	2	...	1	8	19	...	1	6	32

TABLE 22.—UNITED STATES. AVERAGE NUMBER OF ANIMALS PER 10 INHABITANTS, 1920

Source: B.

State.	A.	B.	C.	D.	E.	F.	G.	H.	I.
			CATTLE.						
	Horses.	Mules.	Dairy Cattle.	Beef Cattle.	Sheep.	Goats.	Swine.	Chickens.	Yearly Production of Eggs. Dozens.
Alabama........	0.6	1.3	3.1	1.4	0.3	0.4	6.4	25	100
Arizona.........	4.1	0.4	1.6	22.9	26.4	4.8	1.5	15	75
Arkansas........	1.4	1.8	4.1	2.0	0.6	0.7	7.8	40	160
California.......	1.2	0.2	2.3	3.6	7.0	0.3	2.6	30	187
Colorado........	4.5	0.3	3.4	15.3	19.3	0.3	4.8	31	151
Connecticut......	0.3	...	1.2	0.1	0.1	...	0.4	8	46
Delaware........	1.3	0.4	2.0	0.1	0.1	...	1.8	43	175
Florida..........	0.4	0.4	1.3	5.3	0.7	0.5	7.8	16	67
Georgia.........	0.3	1.4	2.3	1.7	0.2	0.4	7.1	25	80
Idaho...........	6.8	0.2	4.7	11.9	54.5	...	5.6	38	240
Illinois..........	2.0	0.3	2.3	2.0	1.0	...	7.1	39	163
Indiana.........	2.5	0.3	3.2	2.0	2.2	...	12.8	57	284
Iowa............	5.8	0.3	6.3	12.7	4.5	...	32.8	125	500
Kansas..........	6.1	1.4	5.3	11.6	2.0	...	9.8	96	430
Kentucky.......	1.6	1.2	2.7	1.8	2.9	0.1	6.2	43	175
Louisiana.......	1.0	1.0	1.8	2.7	0.7	0.5	4.7	21	73
Maine..........	1.2	...	3.5	0.4	1.5	...	1.2	18	130
Maryland.......	1.0	0.2	1.6	0.4	0.7	...	2.1	24	104
Massachusetts...	0.1	...	0.5	...	...	...	0.3	4	25
Michigan........	1.7	...	3.4	0.9	3.3	...	3.0	30	153
Minnesota.......	3.9	...	8.7	3.9	2.1	...	10.0	55	252
Mississippi......	1.2	1.7	4.4	2.6	0.9	0.6	7.7	36	133
Missouri........	2.7	1.1	3.1	5.0	3.7	0.4	11.4	73	354
Montana........	12.2	0.2	3.9	19.3	38.0	...	3.0	36	234
Nebraska........	7.4	0.8	5.3	19.0	4.4	...	26.4	90	379
Nevada.........	6.5	0.3	3.1	43.0	113.8	0.1	3.5	20	115
New Hampshire..	0.9	...	3.3	0.4	0.6	0.1	0.9	17	113
New Jersey......	0.2	...	0.5	...	...	...	0.4	8	42
New Mexico.....	5.1	0.6	1.8	34.4	45.5	6.2	2.4	20	85
New York.......	0.5	...	2.0	0.1	0.5	...	0.6	10	60
North Carolina...	0.7	1.0	1.8	0.7	0.4	0.1	5.0	29	96
North Dakota....	13.3	0.1	10.2	10.4	4.6	...	7.1	62	323
Ohio............	1.4	0.1	2.3	1.0	3.6	...	5.3	35	177
Oklahoma.......	3.6	1.7	4.0	6.2	0.5	0.2	6.4	66	224
Oregon..........	3.5	0.2	3.6	7.3	25.1	1.7	3.4	32	187
Pennsylvania....	0.6	0.1	1.5	0.3	0.6	...	1.4	17	87
Rhode Island....	0.1	...	0.5	...	...	...	0.2	4	25
South Carolina...	0.5	1.3	1.9	0.7	0.1	0.2	5.0	23	76
South Dakota....	12.9	0.2	8.6	28.4	13.4	...	30.6	104	486
Tennessee.......	1.4	1.5	2.9	2.1	1.6	0.3	47.8	49	208
Texas...........	2.1	1.8	3.1	10.6	5.5	3.7	4.7	39	139
Utah............	2.8	...	2.4	8.9	37.8	0.7	2.2	21	127
Vermont........	2.2	...	11.9	0.4	1.8	...	2.1	23	146
Virginia.........	1.4	0.4	2.2	1.7	1.5	...	4.1	34	158
Washington......	2.2	0.2	2.8	1.4	4.6	0.1	2.0	26	150
West Virginia....	1.2	0.1	1.7	2.3	3.5	...	2.1	28	149
Wisconsin.......	2.6	...	10.5	1.1	1.8	...	6.1	44	202
Wyoming........	10.2	...	3.0	41.6	95.8	0.1	3.8	32	163

TABLE 23.—UNITED STATES. AVERAGE PRICE OF ANIMALS

Sources: D and B.

State.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
			Cattle.					Eggs.		
	Horses. 1920.	Mules. 1920.	Milk Cows. 1920.	Other Cattle. 1920.	Sheep. 1920.	Wool, Weight per Fleece, 1919. Pounds.	Swine, 1920.	Per Dozen. April 1, 1918.	Per Dozen. Dec. 1, 1918.	Chickens, 1920.
Alabama	$128	$171	$ 57	$ 23	$ 6	4.2	$13	$0.27	$0.49	$0.79
Arizona	70	106	95	44	10	6.3	18	0.50	0.77	1.16
Arkansas	97	132	56	24	7	4.9	13	0.29	0.51	0.80
California	94	122	97	51	11	7.4	18	0.34	0.68	1.37
Colorado	79	101	87	48	10	6.6	18	0.36	0.62	0.93
Connecticut	165	....	105	48	13	5.9	28	0.43	0.90	1.69
Delaware	83	111	85	47	10	5.7	19	0.39	0.71	1.17
Florida	140	196	72	27	5	3.5	13	0.33	0.61	1.07
Georgia	159	216	65	27	5	3.1	17	0.30	0.54	0.89
Idaho	77	91	85	44	10	8.4	18	0.35	0.66	0.82
Illinois	94	125	96	55	13	8.0	21	0.34	0.61	0.96
Indiana	101	128	88	52	12	7.4	19	0.34	0.63	0.96
Iowa	89	121	88	49	12	8.0	22	0.34	0.57	0.96
Kansas	79	117	81	48	12	7.6	18	0.33	0.59	0.88
Kentucky	101	126	73	41	11	5.2	13	0.32	0.56	0.80
Louisiana	107	164	67	29	5	3.9	14	0.30	0.54	0.90
Maine	154	....	79	36	10	6.4	25	0.42	0.78	1.55
Maryland	102	134	89	50	11	6.0	19	0.36	0.67	1.08
Massachusetts	155	....	105	45	13	6.6	27	0.56	0.92	1.94
Michigan	95	99	96	43	12	7.4	22	0.37	0.61	1.01
Minnesota	91	99	82	33	11	7.5	24	0.33	0.60	0.79
Mississippi	113	152	62	24	6	4.2	15	0.29	0.50	0.93
Missouri	83	120	79	49	12	7.1	17	0.34	0.58	0.96
Montana	60	....	83	51	10	8.4	20	0.33	0.65	0.90
Nebraska	75	109	83	45	11	7.9	21	0.32	0.56	0.84
Nevada	60	64	88	45	10	7.6	14	0.32	0.72	1.03
New Hampshire	144	....	86	42	10	6.6	24	0.45	0.88	1.69
New Jersey	150	171	128	57	11	7.0	25	0.42	0.84	1.63
New Mexico	68	104	83	46	9	6.3	22	0.39	0.59	0.98
New York	141	148	107	48	12	7.0	23	0.41	0.80	1.40
North Carolina	153	190	78	35	10	4.4	20	0.30	0.54	0.90
North Dakota	81	98	77	41	11	7.7	21	0.31	0.54	0.72
Ohio	109	120	92	49	10	7.5	19	0.35	0.67	0.99
Oklahoma	83	120	68	42	11	7.0	15	0.30	0.56	0.90
Oregon	85	91	83	46	11	8.5	20	0.37	0.71	1.14
Pennsylvania	123	141	98	46	12	7.0	24	0.38	0.72	1.21
Rhode Island	160	....	110	47	12	5.8	30	0.43	0.93	1.86
South Carolina	180	231	85	37	7	4.3	22	0.31	0.54	0.97
South Dakota	71	94	75	44	10	7.5	22	0.31	0.57	0.84
Tennessee	113	139	70	33	11	4.8	15	0.31	0.55	0.88
Texas	96	140	77	42	10	7.2	20	0.29	0.51	0.82
Utah	78	73	78	39	10	7.4	15	0.32	0.60	0.79
Vermont	141	....	89	37	12	7.2	23	0.41	0.77	1.40
Virginia	108	136	76	49	12	5.0	15	0.33	0.60	1.02
Washington	92	106	88	44	11	8.6	23	0.38	0.73	1.19
West Virginia	104	121	76	52	11	5.3	18	0.34	0.60	0.96
Wisconsin	109	112	97	40	11	7.6	24	0.34	0.60	0.89
Wyoming	53	90	93	51	10	8.5	18	0.36	0.66	0.94

TABLE 24.—UNITED STATES. COMPOSITE CROP YIELDS *

Source: B.

State.	A. Highest Composite Crop Yield in 1910–1919.	B. Lowest Composite Crop Yield in 1910–1919.	C. Range from Highest to Lowest, 1910–1919.	D. Average Composite Crop Yield in 1910–1919.	State.	A. Highest Composite Crop Yield in 1910–1919.	B. Lowest Composite Crop Yield in 1910–1919.	C. Range from Highest to Lowest, 1910–1919.	D. Average Composite Crop Yield in 1910–1919.
Alabama	110	64	46	95	Nebraska	125	74	51	98
Arizona	116	75	41	100	Nevada	126	88	38	108
Arkansas	110	76	34	98	New Hampshire	119	85	34	105
California	110	88	22	100	New Jersey	107	89	18	102
Colorado	107	78	29	94	New Mexico	110	84	26	95
Connecticut	112	94	18	103	New York	111	90	21	103
Delaware	112	91	21	101	North Carolina	108	92	16	101
Florida	112	92	20	101	North Dakota	142	43	99	92
Georgia	111	85	26	98	Ohio	112	89	23	102
Idaho	108	82	26	93	Oklahoma	139	62	77	93
Illinois	118	80	38	102	Oregon	117	80	37	98
Indiana	113	92	21	101	Pennsylvania	110	91	19	102
Iowa	128	82	46	105	Rhcde Island	114	92	22	101
Kansas	125	61	64	97	South Carolina	106	83	23	99
Kentucky	109	83	26	100	South Dakota	139	48	91	100
Louisiana	107	85	22	98	Tennessee	105	88	17	99
Maine	118	87	31	104	Texas	124	65	59	97
Maryland	113	90	23	102	Utah	109	78	31	95
Massachusetts	116	90	26	102	Vermont	119	97	22	106
Michigan	111	90	21	99	Virginia	114	90	24	104
Minnesota	123	79	44	103	Washington	105	75	30	96
Mississippi	103	67	36	96	West Virginia	123	78	45	101
Missouri	124	71	53	97	Wisconsin	114	86	28	104
Montana	107	40	67	82	Wyoming	105	65	40	92

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* In computing the yield for each state only the land planted in crops is considered. The yield per acre of the various crops is weighted according to the relative importance of each crop. The resultant figure shows the productivity of an average acre of cropped land in one state or year compared with another state or year. Irrigated areas such as most of the cropped land in Nevada naturally have a high composite crop yield, while places like North Dakota where highly extensive agriculture is practiced have a low yield.

SECTION VI.—MINING

TABLE 25.—WORLD: TOTAL PRODUCTION OF

(In metric tons unless otherwise specified.

Source: F.

Continent and Country.	A. Aluminum.	B. Antimony.	C. Asphalt.	D. Bauxite, Long Tons.	E. Coal.	F. Copper.	G. Gold, Oz. Fine.	H. Graphite.	I. Gypsum.	J Pig-Iron.
World	78.1	24.5	442	531	1,245,758*	1002	22,382	117*	5022*	79,133
Africa:										
Algeria & Tunis	......	0.2	......	......	....	......	......	......	50.4	......
Madagascar	......	......	......	......	....	......	98.9	7.2	......	......
Southern Africa	......	0.03	......	......	8,801	25.4	9,864	......	......	......
Asia:										
China	......	13.0	......	......	14,000	......	177	......	......	......
East Indies	......	......	......	......	....	......	229	......	......	......
India	......	......	......	1.2	14,947	......	540	29.3	25.4	......
Japan	......	0.02	......	......	23,988	73.2	394[8]	0.7	......	56.7
Malay Penin	......	......	......	......	....	......	16.6[9]	......	......	......
Australasia:										
Australia	......	1.0	......	......	12,612	47.3	2,210	......	......	......
New Zealand	......	......	......	......	1,919	......	344	......	......	......
Europe:										
Austria	5.0	......	......	......	54,112[1]	4.1[1]	9.0	49.5	......	2,370[1]
Belgium	......	......	......	......	22,858	......	......	......	......	2,485
France	13.5	5.2	30.9	304	40,051	......	87.7	......	1726	4,207
Germany	0.8	......	106	......	191,511	25.3	6.6	12.0	49.8	19,292
Great Britain	10.0	......	......	8.3	292,048	0.3	1.3	......	242	10,482
Greece	......	(2.5	......	......	Serbia	......	12.1)	......	2.2	......
Hungary	......	1.0	......	......	....	......	94.1	......	......	......
Italy	0.9	0.4	3.0	6.8	701	1.6	0.4	11.1	......	427
Norway	2.5	......	56.8	......	....	11.8	......	......	......	......
Portugal	......	0.01	......	......	....	[2]	0.1	......	......	......
Russia	......	......	......	......	32,206	43	1,074	......	......	4,548
Spain	......	......	5.7	......	4,732	54.7	......	......	......	425
Sweden	(10.0	Switze	rland)	......	364	6.9	0.8	0.1	......	735
North America:										
Canada	5.9	......	......	......	13,623	34.6	803	2.0	577	1,024
Central America	......	......	......	......	(Cuba	3.5)	147	......	......	......
Mexico	......	2.3	......	......	....	52.8	813	1.1	......	......
Trinidad	......	......	208	......	....	......	......	......	......	......
United States	29.5	......	31.8	210	517,285	557	4,300	4.3	2358	31,428
South America:										
Argentina	......	......	......	......	....	0.1	5.1	......	......	......
Bolivia	......	0.03	......	......	....	3.7	84.7	......	......	......
Brazil	......	......	......	......	....	......	173	......	......	......
British Guiana	......	......	......	......	....	......	42.6	......	......	......
Chile	......	......	......	......	....	40.2	35.4	......	......	......
Colombia	......	......	......	......	....	......	144	......	......	......
Peru	......	......	......	......	....	25.7	23.3	......	......	......

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* Approximate.

[1] Austria-Hungary.

[2] Included with Spain.

[3] Bosnia-Herzegovina.

[4] Egypt.

AND QUARRYING

CHIEF MINERALS BY COUNTRIES, 1913

All figures in thousands)

K. Lead.	L. Magnesite.	M. Manganese.	N. Petroleum, Barrels of 42 Gal.	O. Phosphate.	P. Platinum, Troy Ounces.	Q. Pyrite.	R. Silver, Oz. Fine.	S. Sulphur.	T. Tin.	U. Tungsten.	V. Zinc, Long Tons.
1142	396*	2551*	384,668	7255	268	3636	214,381	806	105	9.8	1003
......	......	......	95[4]	2746	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	7.1	......	......
......	......	......	......	......	......	......	......	......	8.0	......	......
......	......	......	11,967	722	......	......	......	......	17.0	......	......
6.0	16.5	828	7,930	......	......	......	......	......	......	1.7	......
3.8	......	2.3	1,942	19	......	115	4,787	59.5	......	0.3	......
......	......	......	......	......	......	......	......	......	63.0	(0.3	Siam)
110	......	0.03	......	......	1.3	......	18,855[7]	......	5.0	0.8	3.7
......	......	......	......	10	......	......	......	......	......	......	......
1.4	201[1]	35.5[1]	7,818	......	......	3.2[3]	1,750	10.6	......	......	20.7
53.6	......	......	......	219	......	0.3	7,164	......	......	......	194
28.8	......	7.7	......	299	......	311	1,511	0.7	......	0.2	63.4
181	......	331	996	......	......	269	17,293	......	......	0.2[6]	277
18.5	......	5.5	......	......	......	11.6	457	......	5.0	0.2	58.3
18.3	132	0.6	......	......	......	129	......	......	......	......	......
1.8	......	4.7[3]	......	......	......	107	280	......	......	......	......
21.7	0.6	1.6	47	......	......	317	421	386	(Nethe	rlands	24.0)
......	......	......	......	0.8	......	441	272	......	......	......	9.6
(Ruma	nia.....	......	13,555	)......	......	391	......	......	......	1.4	......
......	......	1171	62,834	25	250	130	......	......	(Polan	d	15.7)
199	......	21.6	......	3.5	......	927	......	......	33.3	0.2	8.9
1.2	......	4.0	......	......	......	34.3	63	......	......	......	......
17.1	0.5	......	228	0.3	0.1	144	31,846	......	......	......	......
......	(Cuba	11.6)	......	(40	Dutch	West In	dies)	......	......	......	......
41.6	......	......	25,902	......	......	......	49,461	......	......	......	......
......	......	......	504	......	......	......	......	......	......	......	......
396	8.7	4.1	248,446	3069	1.6[5]	347	66,802	317	......	1.4	309
......	......	......	......	......	......	......	......	......	......	0.5	......
......	......	......	......	......	......	......	......	......	......	0.6	......
......	......	122	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	6.6	......	......	......
......	......	......	......	......	15.0	......	......	......	......	......	......
......	......	......	2,133	......	......	......	......	......	......	0.3	......

[5] Includes 1100 troy ounces refined from imported crude.

[6] Includes Austria.

[7] Australasia.

[8] Includes Formosa 39.4 ounce fine and Korea 138.

[9] Includes Siam 2.7 ounces fine.

TABLE 26.—UNITED STATES. TOTAL PRODUCTION OF CHIEF MINERALS IN THE CHIEF MINERAL-PRODUCING STATES AND ALASKA, 1920

Source: G. (All figures are in thousands)

State.	A. Coal. Short Tons.	B. Iron. Ore Shipped from Mines. Long Tons.	C. Petroleum. Barrels.	D. Copper. Smelter Output. Pounds Fine.	E. Lead. Short Tons.	F. Zinc. Short Tons.	G. Gold. Troy Oz.	H. Silver. Troy Oz.	I. Stone. Sold. Short Tons.	J. Cement. Bbls.
Alabama	16,700	5,894	....	....	......	......	......	5	1,355	*
Alaska	68	....	....	66,094	1	1	380	793	......	....
Arizona	....	1	....	552,989	7	1	239	6,098	431	....
Arkansas	2,310	....	....	....	......	......	......	......	643	....
California	....	7	105,668	11,822	2	1	692	1,513	4,425	7,098
Colorado	12,100	2	110	4,283	23	23	368	5,572	553	*
Florida	....	....	....	....	......	......	......	......	340	....
Georgia	....	105	....	4	......	......	......	......	508	*
Idaho	....	....	....	1,922	125	14	23	7,531	254	....
Illinois	90,050	....	10,772	....	2	5	......	9	5,104	5,539
Indiana	30,420	....	932	....	......	......	......	......	2,382	10,788
Iowa	9,170	....	....	....	......	......	......	......	612	4,849
Kansas	6,700	....	38,501	....	17	61	......	......	699	4,341
Kentucky	31,000	....	8,680	....	......	......	......	......	1,423	*
Louisiana	....	....	35,649	....	......	......	......	......	1,284†	
Maine	....	....	....	....	......	......	......	......	192	....
Maryland	4,050	1	....	....	......	......	......	......	812	*
Michigan	1,440	17,511	....	153,484	......	......	......	511	9,813	4,891
Minnesota	....	39,453	....	....	......	......	......	......	686	*
Missouri	5,750	55	....	533	165	25	......	123	1,458	6,018
Montana	4,440	11	336	177,744	16	92	89	13,583	275	*
Nevada	....	....	....	55,580	11	5	172	7,393	1,295‡	....
New Jersey	....	432	....	....	......	77	......	......	1,680	*
New Mexico	3,750	274	....	52,160	1	5	22	765	332	....
New York	....	920	906	....	......	6	......	......	5,970	5,885
North Carolina	....	72	....	....	......	......	......	......	673	....
North Dakota	770	....	....	....	......	......	......	......		....
Ohio	45,000	....	7,412	....	......	......	......	......	9,106	1,780
Oklahoma	4,200	....	105,725	....	65	220	......	......	876	1,553
Oregon	....	....	....	2,529	......	......	47	183	806	2,219 [1]
Pennsylvania	252,100	734	7,454	618	......	......	......	......	14,297	28,269
South Dakota	....	....	....	2	......	......	203	84	197	....
Tennessee	6,750	376	13	16,728	2	19	......	113	1,099	....
Texas	1,800	....	96,000	14	......	......	......	524	680	2,562
Utah	5,870	36	....	110,358	70	4	100	11,564	304	1,093
Virginia	9,850	321	....	....	......	......	......	......	1,467	*
Washington	3,750	3	....	2,126	3	......	7	183	713	[2]
West Virginia	87,500	....	8,173	....	......	......	......	......	2,459	*
Wisconsin	....	981	....	....	3	27	......	......	1,565	....
Wyoming	10,000	407	17,071	24	......	......	......	......	123	....
TOTAL	645,663	69,281	443,402	1,209,161	513	585	2,345	56,543	78,527	100,023

* Other States, 13,137,000. † Connecticut. ‡ Massachusetts.

[1] Oregon and Washington. [2] See Oregon.

TABLE 27.—UNITED STATES. PRINCIPAL MINERAL INDUSTRIES, 1919

Source: B.

The term "coal" here means bituminous coal. Petroleum includes natural gas. Under each state name the first figure shows the percentage of the gainfully employed population engaged in mineral industries; the second is the total of column D for the industries here shown.

A.	B. Mineral Industries Employing Largest Number Wage Earners.	C. Number thus Employed.	D. Per Cent of those Employed in Mining.
Ala.	Coal	24,648	75.7
3.9	Iron ore	6,485	19.9
98.2	Limestone	835	2.6
Ariz.	Copper	14,237	93.2
11.8	Gold, silver	642	4.2
98.1	Lead, zinc	101	0.7
Ark.	Coal	2,787	76.8
0.9	Limestone	114	3.1
80.7	Lead, zinc	28	0.8
Calif.	Petroleum	12,344	63.8
1.6	Gold, silver	3,983	20.6
89.9	Copper	1,055	5.5
Colo.	Coal	11,252	67.0
6.4	Gold, silver	3,495	208.
93.4	Lead, zinc	936	5.6
Conn.	Basalt	363	66.9
0.01, 83.8	Granite	92	16.9
Del. 0.01	(Negligible)	...	..
Fla.	Phosphate rock	2,330	69.1
0.8	Fuller's earth	717	21.3
93.7	Limestone	111	3.3
Ga.	Granite	580	24.2
0.2	Clay	465	19.4
54.7	Barytes	265	11.1
Idaho	Lead, zinc	1,820	74.1
3.4	Gold, silver	349	14.2
91.8	Copper	87	3.5
Ill.	Coal	73,780	93.2
3.3	Petroleum	2,752	3.5
98.3	Limestone	1,244	1.6
Ind.	Coal	24,479	91.5
3.0	Limestone	1,800	6.7
99.7	Petroleum	403	1.5
Iowa	Coal	10,584	93.9
1.7	Gypsum	444	3.9
100.0	Limestone	246	2.2
Kans.	Coal	8,084	50.1
3.3	Petroleum	6,305	39.1
96.3	Lead, zinc	1,141	7.1
Ky.	Coal	39,769	91.3
6.0	Petroleum	2,119	4.9
97.8	Limestone	676	1.6
La.	Petroleum	4,873	63.5
1.1	Sulphur*	.....	..
*	Limestone*	.....	..
Me. 2.4	Granite	747	76.3
Md.	Coal	4,826	85.7
1.1	Granite	235	4.2
93.2	Basalt	183	3.3
Mass.	Granite	1,034	60.7
0.1, 92.8	Basalt	547	32.1
Mich.	Iron ore	16,160	51.6
1.9	Copper	12.235	39.1
96.0	Coal	1,654	5.3
Minn.	Iron ore	16,236	94.0
1.7	Granite	392	2.3
98.3	Manganese	347	2.0
Miss. 0.0	(Negligible)		
Mo.	Coal	7,285	49.0
1.6	Lead, zinc	4,793	32.3
89.2	Limestone	1,171	7.9
Mont.	Gold, silver, copper,		
	lead, zinc	11,862	73.6
7.8	Coal	3,797	23.5
97.6	Limestone	87	0.5
Nebr.	(Negligible)		
0.01			
Nev.	Gold, silver	2,084	49.3
16.5	Copper, lead, zinc	1,884	44.5
94.3	Quicksilver	23	0.5
N. H.	Granite	589	86.4
2.1			
N. J.	Clay	868	19.0
0.3	Basalt	637	13.9
38.5	Limestone	258	5.6
N. Mex.	Coal	3,564	50.2
6.0	Gold, silver, copper,		
93.3	lead, zinc	3,057	43.1
N. Y.	Iron ore	1,811	29.2
0.2	Limestone	1,739	28.0
71.2	Petroleum	868	14.0
N. Car.	Granite	959	50.7
0.2	Mica	274	14.5
73.9	Feldspar	164	8.7
N. Dak.	Coal	774	
0.6			
Ohio	Coal	40,452	82.1
2.6	Petroleum	5,123	10.4
97.1	Limestone	2,262	4.6
Okla.	Petroleum	21,180	62.5
5.6	Coal	7,040	20.8
98.8	Lead, zinc	5,253	15.5
Ore.	Gold, silver, copper	423	57.2
0.7	Basalt	124	16.8
83.3	Limestone	69	9.3
Pa.	Coal	154,992	47.9
9.7	Anthracite	147,372	45.6
96.3	Petroleum	9,065	2.8
R. I. 0.0	Granite	262	71.0
S. Car.	Granite	322	34.5
0.1			
S. Dak.	Sandstone	89	
0.7			
Tenn.	Coal	9,556	66.0
2.1	Phosphate rock	1,568	10.8
85.7	Copper, lead, zinc	1,282	8.9
Texas	Petroleum	13,599	74.9
1.8, 89.8	Coal	2,711	14.9
Utah	Gold, silver, copper,		
	zinc, lead	5,874	59.7
6.8	Coal	3,647	37.0
98.2	Limestone	148	1.5
Vt.	Granite	1,062	36.2
1.4	Slate	1,039	35.4
91.0	Marble	570	19.4
Va.	Coal	11,215	77.1
2.0	Limestone	777	5.3
86.7	Iron ore	623	4.3
Wash.	Coal	4,413	87.4
1.5	Gold, silver, copper,		
1.5	lead, zinc	221	4.4
93.8	Basalt	99	2.0
W. Va	Coal	87,095	86.42
21.1	Petroleum	12,302	12.0
99.6	Limestone	1,003	1.
Wis.	Iron ore	1,145	32.3
0.4	Lead, zinc	1,078	30.4
83.9	Granite	753	21.2
Wyo.	Coal	7,091	73.1
10.8, 95.4	Petroleum	2,167	22.3

* Data not published because only one enterprise reports for each, and the census is not allowed to disclose individual operations.

SECTION VII.—LUMBER

TABLE 28.—UNITED STATES. LUMBER PRODUCTION

Source: C and B.

	State.	A.	B.	C.	D.	E.
		Millions of Board Feet.		Production per Thousand Population.	Production of 1918 in Per Cent of 1910.	Price of Yellow Pine per Thousand Board Feet.
		1910.	1918.	1918.		1919.
Northeastern	Conn.	126	64	46	51	......
	Del.	47	6	27	13	......
	Maine	860	650	846	76	......
	Mass.	239	175	45	73	......
	N. H.	444	350	790	79	......
	N. J.	37	20	7	54	......
	N. Y.	506	335	32	66	......
	Pa.	1,241	530	61	43	......
	R. I.	14	13	22	93	......
	Vt.	285	160	455	56	......
Lake	Mich.	1,681	940	256	56	......
	Minn.	1,458	1,005	419	69	......
	Wis.	1,891	1,275	485	67	......
Miscellaneous	Ariz.	73	84	252	115	28*
	Colo.	121	57	61	47	26*
	Idaho	746	803	1,865	107	28*
	Iowa	75	14	6	19	......
	Kans, & Nebr.	1	8	3	800	......
	Mont.	319	340	620	106	23*
	N. Mex.	84	89	247	106	27*
	S. Dak.	16	30	46	187	23*
	Utah	12	10	22	83	......
	Wyo.	31	8	41	26	......
Central	Ill.	114	42	6	37	......
	Ind.	423	250	85	59	......
	Ky.	754	340	141	45	......
	Mo.	502	273	80	54	......
	Ohio	490	235	41	48	......
	Tenn.	1,016	630	270	62	25
	W. Va.	1,377	720	492	52	......
Pacific	Calif. and Nev.	1,255	1,277	364	102	30*
	Ore.	2,085	2,710	3,460	130	27*
	Wash.	4,097	4,603	3,400	112	26*
Southern	Ala.	1,466	1,270	540	87	24
	Ark.	1,844	1,470	840	80	30
	Fla.	992	950	98	96	30
	Ga.	1,042	515	178	49	25
	La.	3,734	3,450	1,920	92	31
	Md.	155	71	49	46	......
	Miss.	2,122	1,935	108	91	29
	N. Car.	1,825	1,240	479	68	28
	Okla.	165	195	96	118	29
	S. Car.	707	545	324	77	30
	Texas	1,884	1,350	289	72	31
	Va.	1,652	855	369	52	26
	Geographic Groups:					
	Northeast.	3,800	2,303	......	77	......
	Lake......	5,030	3,220	......	64	......
	Southern..	17,587	13,846	......	79	......
	Central....	4,675	2,490	......	53	......
	Pacific....	7,437	8,590	......	115	......
	Miscellan..	1,478	1,441	......	98	......
	United States	40,018	31,890	306	.....	......

* Western yellow pine.

TABLE 29.—CHANGES IN LUMBER PRODUCTION

Source: B.

Species.	A.	B.	C.	D.
	Lumber Sawed, Thousands of Board Feet.		State of Greatest Production,	State of Second Greatest Production,
	1909.	1919.	1919.	1919.
Yellow pine..........	16,277,000	13,063,000	Louisiana	Mississippi
Douglas fir..........	4,856,000	5,902,000	Washington	Oregon
Oak................	4,414,000	2,708,000	Tennessee	Arkansas
Western yellow pine...	1,500,000	1,755,000	Oregon	California
Hemlock............	3,051,000	1,755,000	Wisconsin	Washington
White pine..........	3,900,000	1,724,000	Minnesota	Idaho
Spruce..............	1,749,000	980,000	Washington	Maine
Maple..............	1,107,000	857,000	Michigan	Wisconsin
Red gum............	707,000	851,000	Arkansas	Mississippi
Cypress.............	956,000	656,000	Louisiana	Florida
Chestnut............	664,000	546,000	West Virginia	Pennsylvania
Redwood............	522,000	410,000	California	
Larch...............	421,000	388,000	Idaho	Montana
Birch...............	452,000	375,000	Wisconsin	Michigan
Beech...............	511,000	359,000	Indiana	Michigan

SECTION VIII.—MANUFACTURING

TABLE 30.—THE COTTON SPINNING INDUSTRY, 1921, AND WATER-POWER

Sources: B and H.

Region.	A. Thousands of Cotton Spindles.	B. Spindles per Thousand People.	C. Developed Water Power in 1920, in Horse-power.
ASIA:			
China	1,800	6	2
India	6,770	21	150
Japan	4,130	72	1000
EUROPE:			
Austria	1,140	186	205
Belgium	1,550	205	1
Czecho-Slovakia	3,580	263	50
Denmark	100	33	2
France	9,600	232	1400
Germany	9,400	155	1000
Greece	150	31	6
Italy	4,500	125	1150
Netherlands	630	92	
Norway	70	26	1350
Poland	1,160	48	80
Portugal	400	67	10
Russia	7,100	112	100
Spain	1,800	87	600
Sweden	610	104	1200
Switzerland	1,530	397	1070
Unit. Kingdom	56,140	1200	210
Other Europe	300	.....	444
NORTH AMERICA:			
Canada	1,370	190	2418
Mexico	740	48	400
United States	36,620	347	9243
SOUTH AMERICA:			
Brazil	1,520	50	250
All other countries	300	.....	492

Region.	A. Thousands of Cotton Spindles.	B. Spindles per Thousand People.	C. Developed Water Power in 1920, in Thousands of H.-P.	D. TOTAL POTENTIAL WATER POWER. THOUSANDS OF H.-P. Min. H.P.	E. Max. H.P.
Alabama	1,283	547	260	509	903
Connecticut	1,389	1008	156	72	137
Georgia	2,648	915	342	374	627
Illinois	62	10	84	192	345
Indiana	84	29	29	43	118
Kentucky	96	40	14	83	197
Louisiana	103	57	4	1	2
Maine	1,127	1465	412	443	809
Maryland	143	99	20	48	133
Massachusetts	11,811	3070	330	118	228
Mississippi	177	99	9	32	63
New Hampshire	1,457	3290	217	135	246
New Jersey	424	134	38	44	106
New York	1,017	98	1300	1,037	1,698
North Carolina	5,228	2045	370	578	875
Pennsylvania	269	31	397	276	684
Rhode Island	2,806	4660	43	6	13
South Carolina	5,014	2980	453	460	677
Tennessee	416	178	222	463	761
Texas	167	36	11	255	551
Vermont	145	412	223	94	172
Virginia	589	256	157	492	870
All other States	165	.....	4142	22,188	43,690
New England Div	18,734	.....	1381	868	1,605
Middle Atl. Div	1,710	.....	1735	1,357	2,488
East N. Cen. Div	147*	.....	812	832	1,604
W. N. Cen. Div	....	.....	503	902	1.956
South Atlant. Div	13,522*	.....	1382	2,346	4,257
E. S. Cen. Div	1,971	.....	505	1,087	1,964
W. S. Cen. Div	270*	.....	26	353	822
Mountain Division	....	.....	1007	8,694	16,131
Pacific Division	....	.....	1893	11,504	23,078

* Approximate.

TABLE 31.—UNITED STATES. GENERAL STATISTICS OF MANUFACTURING INDUSTRIES, 1919

Source: B.

State.	A. Number of Establishments.	B. Persons Engaged in Manufacture.	C. Average Number of Wage Earners.	D. Average Number of Wage Earners per Establishment.	E. Number of Simple Industries, 1914.	F. Number of Complex Industries, 1914.	G. Number of Complex for Each Simple Industry, 1914.	H. Value of Products, Millions of Dollars.	I. Values Added by Manufacturer, Millions of Dollars.	J. Per Cent of Total Value Added by Manufacturer.	K. Value Added by Manufacture, per Capita, Dollars.	L. Value Added per Person Engaged in Manufacturing, Dollars.
Alabama	3,654	120,889	107,159	29	25	41	1.6	493	192	39	82	1600
Arizona	480	10,347	8,528	18	11	12	1.1	121	28	23	84	2220
Arkansas	3,123	58,202	49,954	16	17	19	1.1	200	98	49	56	1675
California	11,942	296,997	243,792	20	32	131	4.1	1981	763	38	222	2570
Colorado	2,631	44,729	35,254	13	18	51	2.8	276	101	36	107	2250
Connecticut	4,872	338,033	292,672	60	19	104	5.5	1392	706	51	512	2090
Delaware	668	32,972	29,035	43	16	28	1.8	165	80	48	366	2420
Florida	2,582	82,986	74,415	29	21	24	1.1	213	121	57	124	1450
Georgia	4,803	141,012	123,441	26	20	47	2.4	693	253	36	87	1790
Idaho	922	16,268	13,917	15	12	12	1.0	81	37	45	85	2240
Illinois	18,593	804,755	653,114	35	36	187	5.2	5425	1937	36	298	2410
Indiana	7,916	330,145	277,580	35	28	111	4.0	1940	724	38	246	2195
Iowa	5,683	105,439	80,551	14	17	71	4.2	745	225	30	94	2135
Kansas	3,474	77,010	61,049	18	19	44	2.3	914	164	18	93	2120
Kentucky	3,957	83,954	69,340	18	23	51	2.2	396	160	41	64	1910
Louisiana	2,619	112,523	98,265	38	21	40	1.9	676	245	36	136	2175
Maine	2,995	99,284	88,651	30	22	54	2.5	457	202	44	263	2040
Maryland	4,937	165,869	140,342	29	25	88	3.5	874	325	37	224	1960
Massachusetts	11,906	812,527	713,836	60	24	180	7.7	4011	1750	44	468	2160
Michigan	8,305	549,069	471,242	57	29	112	3.5	3460	1547	45	422	2820
Minnesota	6,225	147,678	115,623	19	18	89	4.9	1218	335	28	140	2270
Mississippi	2,455	64,452	57,560	24	17	27	1.7	198	101	51	56	1570
Missouri	8,592	245,739	195,837	23	26	109	4.2	1599	539	34	158	2195
Montana	1,290	20,692	17,160	13	13	21	1.6	167	45	27	81	2145
Nebraska	2,884	49,076	36,521	13	13	37	2.8	596	115	19	89	2345
Nevada	166	3,563	3,119	19	8	9	1.1	23	6	28	82	1790
New Hampshire	1,499	90,332	83,074	55	17	44	2.6	407	168	41	380	1860
New Jersey	11,059	603,427	508,921	46	29	145	5.0	3676	1405	38	450	2325
New Mexico	387	6,646	5,736	15	7	13	1.9	18	10	57	28	1565
New York	49,333	1,525,314	1,228,369	25	33	228	6.9	8867	3923	45	378	2580
North Carolina	5,999	175,423	157,659	26	21	39	1.9	944	417	44	163	2375
North Dakota	894	6,148	4,472	5	7	14	2.0	57	13	22	20	2100
Ohio	16,125	882,934	730,733	45	35	163	4.7	5100	2188	43	380	2490
Oklahoma	2,445	38,314	29,503	12	17	28	1.6	401	89	22	44	2315
Oregon	2,707	68,005	58,559	22	20	46	2.3	367	161	44	204	2360
Pennsylvania	27,974	1,324,121	1,136,210	41	34	215	6.3	7317	3106	43	357	2345
Rhode Island	2,466	156,012	139,665	56	14	68	4.9	747	331	44	550	2120
South Carolina	2,004	86,360	79,450	40	17	25	1.6	381	153	40	91	1780
South Dakota	1,414	9,034	6,382	5	9	16	1.8	62	19	31	30	2125
Tennessee	4,589	113,300	95,167	21	22	47	2.2	556	211	38	90	1860
Texas	5,724	130,911	107,522	19	23	55	2.5	1000	299	30	64	2285
Utah	1,160	23,107	18,868	16	19	44	1.8	157	47	30	104	2025
Vermont	1,790	38,845	33,491	19	15	34	2.3	168	73	43	204	1875
Virginia	5,603	139,178	119,352	21	25	52	2.1	644	272	42	118	1950
Washington	4,918	150,479	132,928	27	19	58	3.1	810	366	45	270	2435
West Virginia	2,785	93,688	83,036	30	24	35	1.4	472	201	43	137	2145
Wisconsin	10,393	317,899	263,949	25	25	99	4.0	1847	720	39	273	2260
Wyoming	576	8,095	6,634	12	5	10	2.0	81	39	48	40	4840
United States	290,111	10,815,883	9,098,119	31	..	..	...	62,428	25,048	40	237	2310

TABLE 32.—UNITED STATES. DISTRIBUTION AND RELATIVE IMPORTANCE OF INDUSTRIES, 1919

Source: B.

Under each state the first figure shows the per cent of the gainfully employed population engaged in industry; the second is the total of column D.

A.	B. Industries Employing Largest Number Wage Earners.	C. Number Thus Employed.	D. Per Cent of Those Employed in Manufacturing.
Ala.	Lumber mills	25,778	24.1
17	Cotton goods	18,102	16.9
49.1	Railroad shops	8,665	8.1
Ariz.	Smelting and refining, copper	3,112	36.5
18	Railroad shops	2,103	24.7
72.6	Lumber mills	972	11.4
Ark.	Lumber mills	30,429	60.9
12	Railroad shops	4,691	9.4
73.6	Cottonseed oil and cakes	1,661	3.3
Calif.	Shipbuilding	46,052	18.9
28	Canning and preserving	19,575	8.0
33.9	Lumber mills	16,957	7.0
Colo.	Railroad shops	5,739	16.3
20 27.7	Foundry and machine shop, products	2,189	6.2
	Slaughtering and meat-packing	1,848	5.2
Conn. 54	Brass, bronze, and copper products	29,580	10.1
22.3	Foundries and machine shops	20,148	6.9
	Cotton goods	15,647	5.3
Del. 38	Leather, tanned, curried and finished	4,251	14.6
30.8	Railroad shops	3,223	11.1
	Pulp goods	1,485	5.1
Fla.	Lumber mills	21,058	28.3
26 60.7	Tobacco, cigars and cigarettes	12,393	16.6
	Turpentine and rosin	11,748	15.8
Ga.	Cotton goods	38,283	31.0
16	Lumber mills	13,375	10.8
48.5	Railroad shops	8,210	6.7
Idaho	Lumber mills	8,291	59.6
16	Railroad shops	1,877	13.5
75.8	Printing and publishing	371	2.7
Ill. 33	Slaughtering and meat-packing	54,179	8.3
21.5 21.5	Foundries and machine shops	45,879	7.0
	Railroad shops	40,219	6.2
Ind.	Railroad shops	23,099	8.3
32	Iron and steel works	22,362	8.1
23.2	Foundry and machine shop, products	18,828	6.8
Iowa	Railroad shops	13,536	1.8
20	Slaughtering and meat-packing	7,134	8.9
30.1	Foundry and machine-shop, products	3,529	4.4
Kans.	Slaughtering and meat-packing	17,805	29.2
19	Railroad shops	11,196	18.3
53.2	Flour-mills and grist-mills	3,493	5.7
Ky.	Railroad shops	12,372	17.8
17	Lumber mills	7,716	11.1
32.6	Men's clothing	2,590	3.7
La.	Lumber mills	42,194	42.9
20	Sugar, including refining	7,698	7.8
55.2	Railroad shops	4,424	4.5

A.	B. Industries Employing Largest Number Wage Earners.	C. Number Thus Employed.	D. Per Cent of Those Employed in Manufacturing.
Maine	Paper and wood pulp	13,058	14.7
39	Cotton goods	11,763	13.3
39.2	Boots and shoes	9,919	11.2
Md.	Shipbuilding	17,212	12.3
34	Men's clothing	9,256	6.6
24.9	Railroad shops	8,363	6.0
Mass.	Cotton goods	122,499	17.2
51	Boots and shoes	80,166	11.2
33.5	Worsted goods	36,296	5.1
Mich.	Automobiles	126,937	26.9
42 45.7	Automobile bodies and parts	49,048	10.4
	Foundries and machine-shops	39,430	8.4
Minn.	Railroad shops	15,976	13.8
22	Lumber mills	12,602	10.9
30.0	Foundries and machine-shops	6,183	5.3
Miss.	Lumber mills	35,512	61.7
10	Railroad shops	4,030	7.0
73.0	Turpentine and rosin	2,495	4.3
Mo.	Boots and shoes	17,458	9.0
25	Railroad shops	13,471	6.9
20.8	Foundries and machine-shops	9,530	4.9
Mont.	Railroad shops	5,312	31.0
15	Lumber mills	3,693	21.5
57.3	Printing and publishing	829	4.8
Nebr. 18	Slaughtering and meat-packing	10,122	27.7
48.8	Railroad shops	6,178	16.9
	Printing and publishing	1,522	4.2
Nev.	Railroad shops	1,750	56.1
19 63.2	Slaughtering and meat-packing	118	3.8
	Printing and publishing	103	3.3
N. H.	Cotton goods	21,183	25.5
51	Boots and shoes	12,336	14.8
46.7	Woolen goods	5,317	6.4
N. J.	Shipbuilding	50,251	9.9
48	Silk goods	32,326	6.4
21.4	Electrical machinery and supplies	26,135	5.1
N. Mex.	Railroad shops	2,993	52.2
13	Lumber mills	1,240	21.6
78.3	Printing and publishing	257	4.5
N. Y.	Women's clothing	102,652	8.4
39	Men's clothing	62,008	5.0
18.0	Foundries and machine-shops	56,609	4.6
N. Car.	Cotton goods	67,297	42.7
23	Lumber mills	22,728	14.4
64.5	Tobacco, cigars and cigarettes	11,683	7.4
N. Dak.	Railroad shops	1,539	34.4
9 59.6	Flour-mill and grist-mill products	568	12.7
	Printing and publishing	557	12.5
Ohio	Iron and steel works	73,025	10.0
42 28.6	Foundries and machine-shops	72,227	9.9
	Rubber goods	63,637	8.7

TABLE 32.—*Continued*

A.	B. Industries Employing Largest Number Wage Earners.	C. Number Thus Employed.	D. Per Cent of Those Employed in Manufacturing.
Okla.	Petroleum refining	4,612	15.6
15	Railroad shops	2,687	9.1
32.4	Smelting and refining zinc	2,272	7.7
Ore.	Lumber mills	22,884	39.1
27 49.8	Foundries and machine-shops	3,265	5.6
	Shipbuilding	2,990	5.1
Pa.	Iron and steel works	171,715	15.1
42	Railroad shops	78,749	6.9
28.3	Foundries and machine-shops	71,087	6.3
R. I.	Cotton goods	31,405	22.5
59	Worsted goods	21,249	15.2
45.3	Jewelry	10,579	7.6
S. Car.	Cotton goods	48,079	60.5
16	Lumber mills	11,713	14.7
78.7	Fertilizers	2,765	3.5
S. Dak.	Railroad shops	1,222	19.1
12	Automobile repairing	794	12.4
42.0	Lumber mills	673	10.5
Tenn.	Lumber mills	12,847	13.5
18	Knit goods	10,308	10.8
35.0	Railroad shops	10,173	10.7
Texas	Lumber mills	17,359	16.1
16	Railroad shops	16,703	16.0
39.8	Petroleum refining	8,224	7.7
Utah	Railroad shops	3,318	17.6
22	Sugar, beet	2,214	11.7
38.6	Smelting, lead	1,749	9.3
Vt.	Marble and stone work	5,400	16.1
32 34.2	Woolen and worsted goods	3,031	9.1
	Lumber mills	3,020	9.0
Va.	Lumber mills	15,960	13.4
23	Railroad shops	12,086	10.1
29.6	Tobacco, cigars and cigarettes	7,335	6.1
Wash.	Lumber mills	53,393	40.2
31	Shipbuilding	29,391	22.1
67.2	Railroad shops	6,480	4.9
W. Va.	Lumber mills	12,427	15.0
24	Glass	11,668	14.1
43.1	Iron and steel works	11,630	14.0
Wis.	Lumber mills	21,795	8.2
34	Foundries and machine-shops	18,635	7.1
22.0	Engines, steam, gas and water	17,782	6.7
Wyo.	Railroad shops	3,057	46.1
19	Automobile repairing	363	5.5
56.4	Lumber mills	322	4.8

SECTION IX.—TRANSPORTATION AND COMMUNICATION

TABLE 33.—WORLD, RAILWAYS, TELEGRAPHS, AND POST OFFICES

(1919 or nearest available date)

Source: C.

Country.	A. Railway Mileage. Total.	B. Railway Mileage per 10,000 Inhabitants.	C. Railway Mileage per 1000 Square Miles.	D. Miles of Telegraph Wire. Total.	E. Miles of Telegraph Wire per 10,000 Inhabitants.	F. Miles of Telegraph Wire per 1000 Square Miles.	G. Post Offices. Total.	H. Post Offices per 10,000 Inhabitants.
Algeria	2,203	4.0	9.9	25,147	45.2	113	688	1.2
Argentina	22,578	27.3	19.6	164,707	198.8	143	3,463	4.2
Australia	25,657	49.9	8.6	137,663	267.8	46	8,398	16.3
Austria	3,892	6.4	129.1	47,965	79.1	1598	3,118	5.1
Belgian Kongo	1,250	0.8	1.4	2,636	1.8	3	50	.03
Belgium	5,451	7.1	479.3	28,014	36.6	2470	1,708	2.2
Bolivia	1,354	4.7	1.9	6,843	23.7	10	366	1.3
Brazil	18,662	6.1	5.7	45,047	30.0	14	3,642	1.2
British India	36,616	1.2	20.3	357,472	11.3	198	20,030	0.6
Bulgaria	1,824	3.3	38.0	11,653	21.1	248	2,515	4.6
Canada	38,879	46.5	10.4	229,598	274.6	61	12,622	15.1
Chile	5,611	14.5	19.4	32,942	85.1	114	948	2.4
China	6,836	0.2	1.6	56,280	17.6	37	14,519	0.4
Chosen (Korea)	1,102	0.6	13.1	15,533	9.1	185	542	0.3
Colombia	740	1.4	1.7	12,117	22.1	28	843	1.5
Costa Rica	402	8.7	21.5	15,170	326.9	812	201	4.3
Cuba	3,200	11.0	72.4	6,184	21.3	140	658	2.3
Czecho-Slovakia	8,303	6.1	153.5	67,082	49.5	1236	4,979	3.7
Denmark	2,641	9.0	175.5	8,479	28.8	567	1,776	6.0
Dominican Republic	408	4.3	21.1	1,071	11.2	55	93	1.0
Dutch East Indies	1,730	0.4	23.4	23,705	5.0	32	579	0.1
Ecuador	365	1.8	3.1	4,370	21.9	37	194	9.7
Egypt	4,565	3.6	11.9	28,436	22.3	74	2,485	1.9
Finland	2,553	2.4	34.1	....	19.4	....	2,490	2.2
Formosa	332	0.9	24.1	3,736	10.1	272	165	0.4
France	31,958	7.7	150.3	452,192	109.0	2120	15,769	3.8
French Indo-China	1,282	0.7	4.1	20,169	11.9	65	348	0.2
Germany	39,600	7.2	230.2	475,551	86.3	2780	51,573	9.4
Great Britain	23,709	5.1	195.2	264,480	57.4	2190	24,509	5.3
Greece	1,460	2.9	34.8	10,253	20.7	245	1,342	2.7
Guatemala	516	2.3	10.7	4,523	20.3	94	423	1.9
Haiti	114	0.5	10.3	124	0.5	11	88	3.5
Honduras	360	5.7	7.8	4,529	71.8	98	285	4.5
Hungary	13,589	6.3	108.2	110,195	51.5	895	6,794	3.2
Italy	11,891	3.3	197.5	227,165	61.8	2050	11,462	3.1
Japan	7,834	1.4	53.0	119,138	20.5	814	7,647	1.3
Jugoslavia	3,390	1.4	19.5	27,026	9.2	272	3,006	1.8
Mexico	15,842	10.2	20.6	51,716	33.4	67	2,711	1.7
Netherlands	2,113	3.1	169.1	27,073	39.9	2055	1,663	2.5
New Zealand	3,009	25.1	29.0	50,742	422.9	490	2,344	19.5
Nicaragua	209	2.8	4.2	3,637	49.1	73	206	2.8
Norway	2,010	7.6	16.1	73,180	278.0	587	3,880	14.7
Panama	301	6.7	9.3	3,618	80.4	112	96	2.1
Paraguay	266	2.7	2.7	2,050	20.5	21	385	3.9
Persia	97	0.01	0.2	10,754	11.3	17	226	0.2
Peru	1,889	3.3	2.8	78,510	135.4	115	723	1.2
Philippine Islands	757	0.7	6.6	6,218	5.9	54	589	0.6
Porto Rico	340	2.6	99.0	1,545	11.8	448	91	0.7
Portugal	2,047	3.4	57.7	12,540	21.1	353	6,155	10.3
Portuguese colonies	1,286	1.4	1.6	12,948	14.0	16	692	0.8
Rumania	2,382	1.4	19.5	16,039	9.2	134	3,107	1.8
Russia	48,955	2.7	5.9	537,208	29.5	65	19,104	1.0
Salvador	241	1.8	18.3	2,357	17.6	178	162	1.2
Siam	1,333	1.5	6.8	6,353	7.2	33	285	0.3
Spain	9,347	4.5	47.9	69,894	33.5	358	7,585	3.6
Sweden	9,385	16.1	54.2	47,500	81.7	274	4,326	7.4
Switzerland	3,719	9.4	233.2	24,174	61.4	1510	4,381	11.1
Tunis	1,232	6.3	25.5	5,783	29.6	120	457	2.3
Turkey	3,842	1.8	5.6	37,231	17.5	54	1,268	0.6
Union of S. Africa	10,049	14.6	21.2	53,850	78.4	114	2,623	3.8
United States	264,233	24.8	88.8	1,433,978	134.7	392	52,547	4.9
Uruguay	1,654	11.6	22.9	6,214	43.5	86	995	7.0
Venezuela	535	1.9	1.4	5,814	20.4	15	309	1.1

TABLE 34.—WORLD. MOTOR VEHICLES, TELEPHONES, AND TONNAGE OF VESSELS

Source: C.

Continent and Country.	A. Motor Vehicles, 1921.	B. Persons per Motor Vehicle.	C. Telephones. Jan. 1, 1921.	D. Telephones per 100 Inhabitants.	E. Tonnage of Sailing Vessels of 100 Tons or More, 1920.	F. Tonnage of Steam and Motor Vessels of 100 Tons cr More, 1920.	G. Average Size of Steam and Motor Vessels.	H. Average Tonnage of Sailing and Steam Vessels per 100 Inhabitants.
AFRICA	55,832	.....	73,682	.....	......	....	....	......
Algeria	12,000	464	....	.....	......	....	....	......
British East Africa	900	15,500	....	.....	......	....	....	......
British West Africa	566	37,000	....	.....	......	....	....	......
Egypt	5,084	2,500	22,280	0.2	......	....	....	......
Morocco	2,500	2,160	....	.....	......	....	....	......
Tripoli	700	8,500	....	.....	......	....	....	......
Tunis	1,990	975	....	.....	......	....	....	......
Union of S. Africa	26,468	286	51,402	0.7	......	....	....	......
ASIA	134,730	.....	405,970	.....	......	....	....	......
British India	45,983	6,850	30,904	0.01	......	....	....	......
Ceylon	5,350	885	....	.....	......	....	....	......
China	8,150	37,000	67,688	0.02	......	142,834	1400	0.5
Dutch East Indies	45,000	1,040	....	.....	......	....	....	......
French Indo-China	2,300	7,350	....	.....	......	....	....	......
Hong Kong	550	1,074	....	.....	......	....	....	......
Japan	12,260	4,720	330,597	0.6	......	2,995,878	1540	51.6
Malay States	8,000	286	....	.....	......	....	....	......
Philippines	15,709	655	10,000	0.1	......	....	....	......
Russia in Asia	3,200	5,400	....	.....	......	....	....	......
Siam	2,187	4,000	....	.....	......	....	....	......
Straits Settlements	4,500	188	....	.....	......	....	....	......
Turkey	5,500	1,450	....	.....	......	....	....	......
AUSTRALIA	73,900	71	224,000	4.3	......	....	....	......
New Zealand	37,500	31	88,439	7.5	......	....	....	......
EUROPE	1,110,996	.....	4,961,841	.....	......	....	....	......
Austria	16,350	375	133,480	2.2	......	....	....	......
Belgium	33,200	218	63,300	0.8	4,689	410,423	1975	54.8
Bulgaria	3,200	1,560	4,500	0.1	......	....	....	......
Czecho-Slovakia	4,133	3,300	77,195	0.6	......	....	....	......
Denmark	22,260	147	223,736	6.7	83,967	719,444	1375	245.0
Finland	2,000	1,660	50,000	1.5	84,394	82,295	680	50.2
France	236,146	175	473,212	1.2	281,965	2,963,229	2120	78.5
Germany	91,384	665	1,809,574	3.0	253,233	419,438	465	11.0
Great Britain	497,582	94	986,964	2.1	219,771	18,110,653	2240	396.0
Greece	2,000	2,410	4,700	0.1	33,265	496,996	1690	110.0
Hungary	....	.....	57,009	0.7	......	....	....	......
Italy	53,000	680	114,977	0.3	123,964	218,429	2685	62.3
Jugoslavia	2,000	5,650	16,439	0.1	......	....	....	......
Netherlands	13,500	505	158,830	2.3	20,004	1,773,392	1920	262.0
Norway	14,340	187	132,364	4.9	239,828	1,979,560	1240	824.0
Poland	10,700	2,260	69,850	0.2	......	....	....	......
Portugal	5,000	1,200	15,600	0.3	39,967	235,698	1640	46.3
Rumania	8,500	2,040	8,002	0.05	432	74,117	1950	4.3
Russia	35,000	1,800	....	.....	24,983	509,564	970	8.5
Spain	37,560	550	45,000	0.2	59,750	937,280	1560	48.1
Sweden	12,000	485	389,830	6.6	76,502	996,423	930	184.0
Switzerland	18,011	224	152,336	3.8	......	....	....	......
NORTH AMERICA	11,030,164	.....	14,083,250	.....	......	....	....	......
Barbadoes	700	.....	....	.....	......	....	....	......
Canada	463,448	16	856,266	9.8	......	....	....	......
Central America	1,175	4,700	15,143	0.2	......	....	....	......
Cuba	20,000	145	34,250	1.2	8,115	45,324	1130	18.4
Dominican Repub.	1,800	555	....	.....	......	....	....	......
Hawaii	1,210	212	14,376	5.6	......	....	....	......
Jamaica	1,350	660	....	.....	......	....	....	......
Martinique	500	.....	....	.....	......	....	....	......
Mexico	25,000	620	42,896	0.3	......	....	....	......
Newfoundland	600	435	....	.....	......	....	....	......

TABLE 34.—*Continued*

Continent and Country.	A. Motor Vehicles, 1921.	B. Persons per Motor Vehicle.	C. Telephones. Jan. 1, 1921.	D. Telephones per 100 Inhabitants.	E. Tonnage of Sailing Vessels of 100 Tons or More, 1920.	F. Tonnage of Steam and Motor Vessels of 100 Tons or More, 1920.	G. Average Size of Steam and Motor Vessels.	H. Average Tonnage of Sailing and Steam Vessels per 100 Inhabitants.
N. America.—*Con.*								
Panama	1,950	206	....	.....	......	....	....	......
Porto Rico	6,500	200	7,415	0.6	......	....	....	......
Trinidad and Tobago	2,221	.....	....	.....	......	....	....	......
United States	10,505,660	10	13,112,905	12.3	1,474,914	14,574,375	3480	130.0
South America	131,143	.....	282,672	.....	......	....	....	......
Argentina	75,000	113	116,664	1.2	19,905	130,118	865	17.6
Bolivia	300	9,650	2,517	0.1	......	....	....	......
Brazil	25,000	1,230	85,091	0.3	22,636	475,224	1360	16.2
British Guiana	1,050	292	....	.....	......	....	....	......
Chile	10,000	404	28,972	0.8	15,176	88,612	985	25.7
Colombia	2,000	2,920	6,213	0.1	......	....	....	......
Peru	3,343	1,380	8,552	0.15	22,824	66,138	2440	17.2
Uruguay	10,000	46	21,803	1.5	12,380	51,457	1510	138.0
Venezuela	2,500	1,140	8,693	0.3	......	....	....	......

TABLE 35.—UNITED STATES. MOTOR-TRUCK HAULS FROM FARMS TO SHIPPING POINTS, 1918,

Source: D.

Region.	Average Haul in Miles.	Average Number Round Trips per Day.	Average Load.			Average Cost of Hauling One Ton One Mile.		
			Corn. Bushels.	Wheat. Bushels.	Cotton. Bales.	Corn. Cents.	Wheat. Cents.	Cotton. Cents.
United States	11.3	3.4	58	84	6.6	15	15	18
New England	10.0	4.5	62	60	....	11	14	......
Middle Atlantic	12.2	3.4	69	78	....	14	14	......
East North Central	9.3	4.8	64	90	....	11	9	......
W. North Central	10.1	3.8	54	84	....	18	14	......
South Atlantic	9.8	4.0	45	57	6.0	19	18	20
East South Central	12.9	3.2	58	86	7.6	12	10	13
West South Central	13.0	2.9	57	72	6.7	17	15	20
Mountain	21.0	1.2	48	70	....	36	29	......
Pacific	12.3	2.9	74	105	....	20	17	......

TABLE 36—UNITED STATES. WAGON-HAULS FROM FARMS TO SHIPPING POINTS, 1918

Source: D.

Region.	Average Haul in Miles.	Average Number Round Trips per Day.	Average Load.			Average Cost of Hauling One Ton One Mile.		
			Corn. Bushels.	Wheat. Bushels.	Cotton. Bales.	Corn. Cents.	Wheat. Cents.	Cotton. Cents.
United States	9.0	1.2	39	56	3.6	33	30	48
New England	7.2	1.8	38	45	....	39	38	......
Middle Atlantic	7.6	1.6	39	47	....	39	38	......
East North Central	6.3	2.0	41	54	....	29	26	......
W. North Central	7.9	1.5	42	57	....	33	29	......
South Atlantic	8.4	1.4	29	36	3.5	41	39	48
East South Central	10.4	1.0	26	38	3.2	45	36	52
W. South Central	10.9	1.0	26	46	3.8	49	32	47
Mountain	20.2	0.4	46	66	....	52	42	......
Pacific	11.2	1.4	71	67	....	23	22	......

TABLE 37.—UNITED STATES. RAILROADS, ELECTRIC ROADS, MOTOR VEHICLES AND TELEPHONES

Source: C.

State.	A. Railroad Mileage, 1918.	B. Miles of Railroad Line per 10,000 Inhabitants, 1918.	C. Miles of Railroad Line per 10 Square Miles, 1918.	D. Miles of Electric Railways, 1920.	E. Passenger Cars and Trailers on Electric Railways, 1920.	F. Passenger Cars on Electric Railways per 100,000 Inhabitants, 1920.	G. Motor Vehicles, 1921.	H. Persons per Motor Vehi-	I. Telephones, Jan. 1, 1921.	J. Telephones per 100 Population, Jan. 1, 1921.
Alabama	5,413	22.5	1.1	362	516	22	82,343	29.5	92,045	3.9
Arizona	2,479	90.6	0.2	54	53	17	35,049	10.1	22,935	6.7
Arkansas	5,161	28.7	1.0	129	250	14	67,446	26.4	101,745	5.8
California	8,268	26.4	0.5	3322	3978	116	673,830	5.8	622,862	17.8
Colorado	5,615	55.1	0.5	484	589	63	145,739	6.6	136,212	14.3
Connecticut	999	7.8	2.1	1426	1967	142	137,526	10.4	178,531	12.7
Delaware	335	15.4	1.7	159	323	145	21,413	10.5	23,684	10.5
Florida	5,222	55.4	1.0	219	316	33	97,837	10.2	58,409	5.9
Georgia	7,436	25.3	1.3	488	720	25	131,942	22.4	141,481	4.8
Idaho	2,884	61.9	0.3	102	37	9	51,294	8.8	49,909	11.3
Illinois	12,126	19.2	2.2	3738	6555	101	670,434	9.9	1,169,491	17.8
Indiana	7,411	25.9	2.1	2420	1931	66	400,342	7.4	477,471	16.2
Iowa	9,807	44.2	1.8	946	1001	42	460,528	5.3	531,206	22.0
Kansas	9,386	50.0	1.1	515	414	23	291,309	6.1	349,056	19.6
Kentucky	3,872	16.1	1.0	456	1035	43	126,371	19.2	167,408	6.9
Louisiana	5,277	27.9	1.2	323	705	39	80,500	22.6	79,388	4.4
Maine	2,269	29.0	0.8	520	548	71	77,527	10.0	102,873	13.4
Maryland	1,440	10.4	1.4	708	2109	146	140,572	10.2	134,524	9.2
Massachusetts	2,126	5.5	2.6	2887	6682	173	360,732	10.9	578,746	14.9
Michigan	8,888	28.3	1.5	1787	2862	78	477,037	8.0	477,906	12.8
Minnesota	9,143	38.9	1.1	735	1391	58	328,700	7.4	408,788	17.0
Mississippi	4,448	22.2	1.0	98	118	7	65,139	27.4	64,026	3.6
Missouri	8,193	23.7	1.2	1167	2841	83	346,437	9.9	551,500	16.2
Montana	5,037	103.0	0.3	857	145	27	58,785	9.8	55,802	9.9
Nebraska	6,167	47.5	0.8	302	603	47	238,704	5.5	269,618	20.7
Nevada	2,296	198.2	0.2	11	9	12	10,819	7.0	9,383	12.2
N. Hampshire	1,253	28.0	1.4	251	290	66	42,039	10.6	62,346	14.0
New Jersey	2,352	7.6	3.1	1592	3173	100	272,994	11.9	312,781	9.8
New Mexico	2,978	67.7	0.2	11	16	4	24,703	14.8	17,194	4.7
New York	8,389	7.9	1.8	5772	19655	189	812,031	13.0	1,519,384	14.5
North Carolina	5,470	22.1	1.1	303	336	13	148,684	17.6	108,874	4.2
North Dakota	5,313	66.8	0.8	27	61	9	92,644	7.1	87,723	13.5
Ohio	9,012	17.1	2.2	4191	5707	97	720,632	8.2	937,509	16.1
Oklahoma	6,528	27.3	0.9	331	303	15	221,300	9.1	225,847	11.0
Oregon	3,298	36.9	0.3	696	824	105	118,325	6.8	138,123	17.5
Pennsylvania	11,657	13.2	2.6	4307	7548	86	689,589	12.9	939,970	10.7
Rhode Island	212	3.3	2.0	423	1141	189	54,957	11.2	78,745	12.9
South Carolina	3,804	22.9	1.2	147	214	13	90,546	18.9	53,151	3.1
South Dakota	4,278	57.9	0.6	26	37	6	119,274	5.4	104,378	16.2
Tennessee	4,083	17.6	1.0	454	841	36	117,025	20.1	162,244	6.9
Texas	16,085	34.8	0.6	1022	1433	31	467,616	10.2	441,126	9.4
Utah	2,161	47.5	0.3	448	254	56	47,523	9.7	52,063	11.4
Vermont	1,081	29.5	1.2	103	127	36	36,965	9.8	51,195	14.5
Virginia	4,694	21.0	1.2	440	835	36	141,000	16.7	135,974	5.8
Washington	5,612	33.6	0.8	1074	1180	87	185,359	7.5	217,713	15.8
West Virginia	3,994	27.7	1.7	671	655	45	93,894	16.0	107,552	7.2
Wisconsin	7,609	29.7	1.4	768	1014	39	341,841	7.8	396,539	14.9
Wyoming	1,931	101.2	0.2	22	20	10	26,619	7.6	21,791	11.0

TABLE 38.—TONNAGE OF SHIPS ENTERING UNITED STATES PORTS, BY NATIONALITY, COUNTRY OF DEPARTURE, AND DESTINATION OF SHIPS, 1913 AND 1920

Source: C.

(In thousands of tons)

Country.	A.	B.	C.	D.	E.	F.
	Tonnage of Ships Belonging to Each Nationality and Entering United States Ports from Foreign Countries.		Tonnage of Ships Coming from Other Countries to the United States.		Tonnage of Ships Leaving the United States for Other Countries.	
	1913.	1920.	1913.	1920.	1913.	1920.
Austria	438	......	......	......	......	......
Belgium	352	374	1,024	1,587	1,173	1,573
Denmark	481	567	......	......	......	......
France	1,027	1,144	1,241	2,912	1,628	4,278
Germany	4,578	30	3,309	1,070	3,832	1,232
Italy	838	1,122	1,308	2,152	1,537	2,928
Netherlands	1,049	966	1,324	2,204	1,851	2,528
Norway	2,774	2,319	......	......	......	......
Portugal	14	41	......	......	......	......
Russia	130	30	......	......	......	......
Spain	391	834	762	876	393	784
Sweden	60	355	......	......	......	......
United Kingdom	19,697	15,056	7,910	10,249	7,377	7,351
Nova Scotia, New Brunswick and Prince Edward Island	....	....	1,591	949	1,632	832
British Columbia	....	....	2,939	3,070	2,928	3,053
Central American States	....	....	1,986	1,568	2,177	1,524
Mexico	....	....	2,061	8,584	2,291	8,647
British West Indies and British Honduras	....	....	870	729	1,098	623
Cuba	....	....	3,237	4,599	2,597	4,878
Argentina	....	....	512	937	622	1,439
Brazil	....	....	1,246	578	697	1,340
Colombia	....	....	206	167	311	365
British East Indies	....	....	372	498	147	383
China	....	....	439	793	392	840
Japan	....	....	711	1,060	562	1,328
Australasia	....	....	279	274	613	494
All other countries	....	....	4,645	6,674	3,704	8,560
Total	....	....	37,973	51,532	37,566	54,981
All other foreign	904	2,469	......	......	......	......
Total foreign	32,732	25,306	......	......	......	......
American	5,241	26,225	......	......	......	......
Grand total	37,973	51,532	......	......	......	......

SECTION X.—COMMERCE

TABLE 39.—WORLD. FOREIGN COMMERCE, 1913

Source: C.

Continent and Country.	A. Total Imports (Thousands of Dollars).	B. Imports per Capita (Dollars).	C. Imports from United States (Thousands of Dollars).	D. Percentage of Imports from United States.	E. Imports from United States per Capita (Dollars).	F. Total Exports (Thousands of Dollars).	G. Exports per Capita (Dollars).	H. Exports to United States (Thousands of Dollars).	I. Percentage of Exports from United States.	J. Exports to United States per Capita (Dollars).	K. Number of Times by which Imports Exceed Exports.	L. Number of Times by which Exports Exceed Imports.
AFRICA:												
Algeria	128 829	23.10	2 506	2.0	0.45	98 529	17.70	786	0.8	0.18	1.3	..
Belgian Kongo (1912)	10 467	0.52	62	0.6	0.003	11 566	0.58	....	..	0.00	..	1.1
Egypt	137 738	12.20	2 596	1.9	0.23	156 506	13.90	12 283	7.9	1.09	..	1.1
Eritrea (1912)	3 637	12.10	11	0.3	0.04	1 809	0.60	20	1.1	0.7	20.2	..
Liberia	1 411	0.94	27	1.9	0.02	1 112	0.74	....	0.028	0.00	1.3	..
Libia	5 107	5.11	245	4.8	0.25	686	0.69	73	10.6	0.07	7.4	..
Morocco	44 625	8.93	78	0.2	0.02	8 968	1.79	119	1.3	0.02	5.0	..
Sudan	10 429	3.47	43	0.4	0.01	5 858	1.95	437	7.5	0.15	1.8	..
Tunis	27 841	14.50	1 374	4.9	0.71	34 482	17.90	54	0.2	0.03	..	1.2
Union of South Africa	187 489	33.75	17 851	9.5	3.11	316 880	55.35	2 610	0.8	0.46	..	1.6
ASIA:												
British India	522 389	1.64	16 881	3.2	0.53	782 413	2.48	60 963	7.8	0.19	..	1.5
China	427 406	1.27	25 826	6.0	0.08	294 010	0.87	27 447	9.3	0.08	1.5	..
Chosen (Korea)	35 647	2.36	3 909	11.0	0.26	15 378	1.01	45	0.3	0.00	2.4	..
Dutch East Indies	176 037	3.75	3 631	2.1	0.08	249 443	5.30	5 359	2.1	0.11	..	1.4
Formosa	30 305	8.53	693	2.3	0.20	26 582	7.46	2 855	10.7	0.80	1.1	..
French Indo-China	45 318	2.67	594	1.3	0.04	55 094	3.25	375	0.7	0.02	..	1.2
Japan	363 257	6.85	60 959	16.8	1.15	314 965	5.95	91 868	29.2	1.74	1.2	..
Persia	49 995	5.25	78	0.5	0.01	36 128	3.80	528	1.5	0.06	1.4	..
Philippine Islands	56 328	6.52	25 647	45.5	2.95	53 683	6.22	19 971	37.2	2.31	1.0	..
Siam (Bangkok)	28 203	3.45	746	2.6	0.09	30 329	3.71	68	0.2	0.01	..	1.1
AUSTRALASIA:												
Australia	388 102	78.00	53 087	13.7	10.55	365 426	72.40	12 632	4.9	2.51	1.1	..
New Zealand	108 466	94.00	10 259	9.5	7.88	111 865	96.60	4 840	4.3	4.20	..	1.0
EUROPE:												
Austria-Hungary	691,538	13.40	65,637	9.5	1.27	562,247	10.90	14,258	2.5	0.28	1.2	..
Belgium	974,623	127.50	81,156	8.3	10.65	717,152	93.40	20,532	2.9	2.68	1.4	..
Bulgaria (1912)	41,130	8.62	877	2.1	0.18	30,186	6.32	308	1.0	0.06	1.4	..
Crete (1911)	4,122	12.00	115	2.8	0.33	3,017	8.76	147	4.9	0.43	1.4	..
Denmark	229,234	80.00	23,310	10.2	8.15	170,812	59.60	1,021	0.6	0.36	1.3	..
Finland	95,619	30.45	3,890	4.1	1.24	77,543	24.75	123	0.2	0.04	1.2	..
France	1,642,117	41.50	168,060	10.2	4.24	1,326,950	33.45	81,218	6.1	2.05	1.2	..
Germany	2,563,354	38.20	407,266	15.9	6.07	2,403,311	35.80	169,742	7.1	2.52	1.1	..
Greece	34,341	8.76	550	1.6	0.14	13,328	3.41	1,788	13.4	0.48	2.6	..
Italy	702,090	19.90	97,584	13.9	2.76	483,255	13.68	49,732	10.3	1.41	1.5	..
Netherlands	1,574,990	254.00	177,979	11.3	28.60	1,239,360	199.50	52,771	4.3	8.50	1.3	..
Norway	148,022	60.90	10,506	7.1	4.32	102,084	42.00	8,006	7.8	3.28	1.5	..
Portugal	96,096	16.12	10,683	11.1	1.79	38,110	6.39	1,323	3.5	2.22	2.5	..
Rumania	113,872	14.93	6,164	5.4	0.81	129,446	17.00	21	0.02	0.00	..	1.1
Russia	707,627	4.22	40,733	5.8	0.24	782,869	4.66	7,290	0.9	0.04	..	1.1
Serbia (1912)	20,476	4.43	248	1.2	0.05	16,255	3.52	757	4.7	0.16	1.3	..
Spain	238,635	11.96	30,147	12.6	1.51	194,281	9.75	12,969	6.7	0.65	1.2	..
Sweden	226,872	40.50	20,524	9.0	3.66	219,049	39.00	9,220	0.2	1.65	1.0	..
Switzerland	370,525	98.00	22,754	6.1	6.00	265,645	70.20	26,331	49.9	6.95	1.4	..
Turkey (1912)	193,022	9.36	5,256	2.7	0.26	106,008	5.15	6,542	6.2	0.32	1.8	..
United Kingdom	3,207,801	69.50	634,343	19.9	13.70	2,556,106	55.20	143,538	5.6	3.10	1.3	..
NORTH AMERICA:												
Canada	670,089	86.50	435,861	65.0	56.20	355,755	46.80	140,757	39,6.	18.10	1.8	..
Costa Rica	8,685	21.15	4,468	51.4	10.85	10,322	25.10	5,241	50.8	12.75	..	1.2
Cuba	132,337	53.50	70,707	53.3	28.60	165,207	66.80	132,581	80.3	53.50	..	1.3
Dominican Republic	9,272	12.80	5,769	62.2	7.96	10,470	14.42	5,601	53.5	7.73	..	1.1

TABLE 39.—*Continued*

Continent and Country.	A. Total Imports (Thousands of Dollars).	B. Imports per Capita (Dollars).	C. Imports from United States (Thousands of Dollars).	D. Percentage of Imports from United States.	E. Imports from United States per Capita (Dollars).	F. Total Exports (Thousands of Dollars).	G. Exports per Capita (Dollars).	H. Exports to United States Thousands of Dollars).	I. Percentage of Exports from United States.	J. Exports to United States per Capita (Dollars).	K. Number of Times by which Imports Exceed Exports.	L. Number of Times by which Exports Exceed Imports.
NORTH AMERICA.—*Con.*												
Guatemala	10,062	4.75	5,053	50.2	2.39	14,450	6.72	3,923	27.1	1.86	..	1.4
Haiti	10,935	4.38	6,499	59.4	2.60	17,273	6.91	842	4.9	0.34	..	1.6
Honduras	5,133	8.70	3,464	67.5	5.88	3,300	5.60	2,869	86.9	4.86	1.6	..
Mexico	97,495	6.30	48,449	49.7	3.14	149,602	9.68	115,554	77.2	7.48	..	1.5
Nicaragua	5,768	8.35	3,244	56.2	4.70	7,712	11.18	2,722	35.3	3.95	..	1.3
Panama	11,397	29.40	6,379	56.0	16.48	5,383	13.90	4,802	89.2	12.40	2.1	..
Salvador	6,167	5.10	2,490	40.4	2.06	7,666	6.35	1,310	17.1	1.08	..	1.2
United States*	1,813,008	18.13	....	..	0.00	2,428,506	24.29	....	..	0.00	..	1.3
SOUTH AMERICA:												
Argentina	406,805	46.70	59,862	14.7	6.86	466,582	53.70	22,093	4.7	2.54	..	1.2
Bolivia	21,358	9.38	1,900	8.9	0.84	36,551	16.10	218	0.6	0.10	..	1.7
Brazil	326,865	13.42	51,358	15.7	2.11	315,586	12.96	102,700	32.5	4.22	1.0	..
Chile	120,274	35.05	20,089	16.7	5.80	144,653	41.65	30,418	21.0	8.78	..	1.2
Colombia	26,987	4.93	7,630	28.3	1.39	34,316	6.26	18,862	55.0	3.44	..	1.3
Ecuador	8,849	5.90	2,822	31.9	1.88	15,810	10.55	3,839	24.3	2.56	..	1.8
Paraguay	8,120	10.15	488	6.0	0.61	5,631	7.04	67	1.2	0.08	1.4	..
Peru	29,631	5.11	8,542	28.8	1.47	44,469	7.65	14,761	33.2	2.54	..	1.5
Uruguay	50,666	41.30	6,300	12.4	5.13	65,142	53.15	2,972	4.6	2.42	..	1.3
Venezuela	19,677	7.15	7,684	39.1	2.79	28,777	10.42	9,850	34.2	3.58	..	1.5

* Includes Alaska, Hawaii and Porto Rico.

TABLE 40.—FOREIGN COMMERCE OF PRINCIPAL PORTS OF THE WORLD, 1913

Source: C.

Continent, Country, and City.	A. Imports. Thousands of Dollars.	B. Exports. Thousands of Dollars.	C. Total Commerce. Thousands of Dollars.
AFRICA:			
Egypt—			
Alexandria	117,443	152,713	270,156
ASIA:			
British Colonies—			
Bombay*	160,074	204,671	364,745
Calcutta*	168,633	278,596	447,229
Singapore	186,376	145,433	331,809
China—			
Canton	23,176	40,779	63,955
Shanghai	178,206	128,930	307,136
Tientsin	37,437	5,935	43,372
Japan—			
Kobe	84,894	172,611	257,505
Osaka	36,579	20,754	57,333
Yokohama	157,777	117,081	274,858
AUSTRALIA:			
Sydney	151,897	151,376	303,273
Melbourne	118,377	86,388	204,765
EUROPE:			
Austria-Hungary—			
Fiume*	43,833	53,923	97,756
Trieste	175,997	161,430	337,427
Belgium—			
Antwerp*	625,991	588,734	1,214,725
France—			
Bordeaux	89,163	78,606	167,769
Dunkirk	187,538	36,201	223,739
Havre	357,924	258,795	616,719
Marseille	389,639	365,733	755,372
Germany—			
Bremen	370,608	211,421	582,029
Hamburg	1,084,325	817,275	1,901,600
Italy—			
Genoa	199,780	103,061	302,841
Naples	61,492	38,178	99,670
Russia—			
Batum	5,446	24,605	30,051
Kherson	20	21,483	21,503
Libau	20,484	20,923	41,407
Nikolaiev	134	37,049	37,183
Novorossisk	7,473	38,350	45,823
Odessa	33,899	44,923	78,822
Petrograd	110,934	69,112	180,046
Reval	40,265	11,067	51,332
Riga	69,597	104,450	174,047
Rostov	548	36,583	37,131
Vindau	8,477	37,950	46,427
Vladivostok	22,549	1,745	24,294
Spain—			
Barcelona	79,428	29,839	109,267
Bilbao	22,272	9,929	32,201
Valencia	14,342	19,162	33,504
EUROPE.—*Con.*			
Turkey—			
Constantinople*	74,360	28,600	102,960
United Kingdom—			
Belfast	47,263	8,500	55,763
Bristol	87,692	19,652	107,344
Cardiff	32,628	83,764	116,392
Glasgow	89,959	176,514	266,473
Grimsby	77,130	107,073	184,203
Harwich	124,764	42,142	166,906
Hull	242,548	169,180	411,728
Leith	76,641	35,202	111,843
Liverpool	854,030	950,368	1,804,398
London	1,235,504	768,483	2,003,987
Manchester	171,742	102,238	273,980
Southampton	124,061	136,634	260,695
Tyne ports	55,230	64,324	119,554
NORTH AMERICA:			
Canada—			
Montreal	155,909	85,080	240,989
Cuba—			
Havana	97,642	48,145	145,787
Mexico—			
Tampico	22,825	40,379	63,204
Vera Cruz	40,732	42,118	82,850
United States—			
Galveston	7,821	281,458	289,279
Georgia	4,462	58,235	62,697
Maryland	32,895	116,474	149,369
Massachusetts	146,599	69,553	216,152
New Orleans	82,399	169,980	252,379
New York	1,048,321	917,936	1,966,257
Oregon	4,462	58,235	62,697
Philadelphia	93,210	76,315	169,525
San Francisco	62,502	66,021	128,523
Washington (Puget Sd.)	51,474	62,548	114,022
SOUTH AMERICA:			
Argentina—			
Buenos Aires	325,826	164,480	490,306
Brazil—			
Rio de Janeiro	127,285	38,773	166,058
Santos	88,604	159,063	247,667
Chile—			
Antofagasta	12,109	23,657	35,766
Iquique	10,390	25,589	35,979
Valparaiso	57,718	7,424	65,142
Peru—			
Callao	18,936	11,066	30,002
Uruguay—			
Montevideo†	43,587	31,431	75,018

* Figures for 1912.
† Figures for 1911.

TABLE 41.—UNITED STATES. FOREIGN IMPORTS AND EXPORTS OF THE PRINCIPAL CUSTOMS DISTRICTS, 1920

Source: C. (Chief ports in parenthesis)

Customs District.	A. Imports. (Dollars).	B. Exports. (Dollars).	Customs District.	A. Imports. (Dollars).	B. Exports. (Dollars).
Massachusetts (Boston)	392,752,807	192,802,178	San Francisco	211,928,222	225,827,836
New York	2,892,621,089	3,283,873,342	Galveston	30,729,718	649,252,750
Philadaelphia	282,163,120	442,249,733	Georgia (Savannah)	54,269,006	202,014,024
Maryland (Baltimore)	69,824,171	381,556,802	Washington (Seattle)	134,078,541	192,879,940
New Orleans	274,073,005	712,380,439	Buffalo	121,436,287	237,929,508
			Chicago	64,503,928	25,800,337
			Michigan (Detroit)	107,350,596	356,220,310

SECTION XI.—CONSUMPTION

TABLE 42.—UNITED STATES. CONSUMPTION, 1920

Product.	A. Per Cent of Domestic Product Exported.	B.	C. Per Cent of United States Consumption Derived from Abroad.	D.	E. Per Cent of World's Production Consumed in United States.	F. Consumption per Capita in the United States.
	1911.	1920.	1911.	1920.		
Corn	2.25	0.6	0.0	0.4	......	26.7 bu.
Wheat	65.8	23.5	0.2	0.8	......	6.8 bu.
Cotton	68.2	56.2†	4.2	10.1	......	30.2 lb.
Coke	2.5	1.7	0.4	0.1	......	0.38 ton
Coal (anthracite)	4.2	6.0	0.0	0.1	......	0.74 ton
Coal (bituminous)	3.2	5.6	0.5	0.3	......	3.86 ton
Wool	0.0	2.3	28.9	57.9	......	6.7 lb.
Salt	1.2	1.9	3.3	0.0	......	128.00 lb.
Sugar	......	......	26.1*+50.0	19.9*+62.7	28.6	91.5 lb.
Pig iron	0.6	0.8	0.75	0.59	......	0.29 ton
Steel rails	12.6	25.0	......	1.4	......	0.02 ton
Coffee	......	......	100.0	100.0	......	12.8 lb.
Tea	......	......	100.0	100.0	......	0.84 lb.
Tin plate	4.4	17.8	0.0	0.0	......	24.2 lb.

* From United States possessions. † 1919.

TABLE 43.—UNITED STATES. CONSUMPTION AND VALUE PER CORD OF FIRE WOOD ON FARMS, 1920

Source: C.

State.	A. Cords per Farm.	B. Value per Cord.	State.	A. Cords per Farm.	B. Value per Cord.	State.	A. Cords per Farm.	B. Value per Cord.
		$			$			$
Alabama	13	3.20	Maine	12	10.00	Ohio	11	5.00
Arizona	9	6.00	Maryland	11	6.10	Oklahoma	6	4.90
Arkansas	15	3.50	Massachusetts	9	9.00	Oregon	10	5.90
California	9	9.50	Michigan	13	7.90	Pennsylvania	6	5.40
Colorado	7	6.40	Minnesota	9	7.70	Rhode Island	10	7.50
Connecticut	12	7.00	Mississippi	13	3.10	South Carolina	12	4.00
Delaware	10	6.20	Missouri	12	4.40	South Dakota	1	7.50
Florida	8	3.90	Montana	5	7.00	Tennessee	17	3.40
Georgia	13	4.00	Nebraska	3	6.90	Texas	8	5.50
Idaho	9	5.50	Nevada	11	9.00	Utah	6	6.10
Illinois	6	5.40	New Hampshire	12	8.00	Vermont	15	8.00
Indiana	11	5.70	New Jersey	6	7.50	Virginia	15	4.50
Iowa	6	6.30	New Mexico	8	6.10	Washington	11	7.50
Kansas	5	5.50	New York	10	8.80	West Virginia	10	4.30
Kentucky	14	3.30	North Carolina	17	4.20	Wisconsin	12	8.50
Louisiana	11	3.70	North Dakota	2	10.00	Wyoming	6	7.50

TABLE 44.—UNITED STATES. PRICES OF COAL AND GAS IN SPECIFIED CITIES, 1920

Source: C.

City	A. Anthracite Stove Coal. Dec., 1920. Per Ton of 2000 Pounds.	B. Bituminous Coal. Dec., 1920. Per Ton of 2000 Pounds.	C. Gas. 1920. Per Thousand Cubic Feet.	City.	A. Anthracite Stove Coal. Dec., 1920. Per Ton of 2000 Pounds.	B. Bituminous Coal. Dec., 1920. Per Ton of 2000 Pounds.	C. Gas. 1920. Per Thousands Cubic Feet.
Atlanta, Ga...........	18.50	12.15	1.15	Minneapolis, Minn....	18.37	15.53	0.95
Baltimore, Md.........	15.50	11.64	0.75	Mobile, Ala...........	....	14.34	1.35
Birmingham, Ala......	....	10.57	0.95	Newark, N. J..........	13.00	....	1.15
Boston, Mass.........	16.00	....	1.07	New Haven, Conn.....	17.75	....	1.10
Bridgeport, Conn......	17.50	....	1.10	New Orleans, La......	22.50	13.83	1.30
Buffalo, N. Y.........	13.22	....	.35* 1.45	New York, N. Y......	14.71	....	0.80
Butte, Mont..........	....	12.80	1.50	Norfolk, Va..........	16.00	13.68	1.60
Charleston, S. C......	17.88	13.25	1.25	Omaha, Nebr.........	23.75	14.03	1.15
Chicago, Ill...........	16.64	10.44	0.90	Peoria, Ill............	17.00	7.75	0.85
Cincinnati, Ohio......	15.97	8.87	0.35*	Philadelphia, Pa.......	14.98	....	1.00
Cleveland, Ohio.......	15.88	9.64	.35*0.80	Pittsburgh, Pa........	18.50	8.81	0.35*
Columbus, Ohio.......	....	10.05	0.30*	Portland, Me.........	17.28	14.05	1.40
Dallas, Texas.........	....	16.33	0.45*	Portland, Ore.........	....	14.25	0.95
Denver, Colo.........	17.60	11.66	0.95	Providence, R. I......	17.10	14.00	1.30
Detroit, Mich.........	16.65	12.81	0.79	Richmond, Va........	15.63	12.47	1.00
Fall River, Mass......	16.33	14.00	1.05	Rochester, N. Y.......	13.40	....	0.95
Houston, Texas.......	....	16.23	1.09	St. Louis, Mo.........	17.05	8.37	0.85
Indianapolis, Ind......	15.75	10.73	0.60	St Paul, Minn........	18.46	16.98	0.85
Jacksonville, Fla......	23.00	16.00	1.50	Salt Lake, Utah.......	18.50	10.01	1.30
Kansas City, Mo......	19.33	10.89	0.80*	San Francisco, Calif...	....	19.40	0.95
Little Rock, Ark......	17.00	15.13	0.45*	Savannah, Ga.........	19.10	17.35	1.25
Los Angeles, Calif.....	....	19.22	0.75†	Scranton, Pa.........	9.83	....	1.30
Louisville, Ky.........	....	11.09	0.65*	Seattle, Wash.........	....	11.61	1.50
Manchester, N. H.....	18.00	14.33	1.10	Springfield, Ill........	....	4.95	1.10
Memphis, Tenn.......	18.00	11.55	1.10	Washington, D. C.....	15.60	11.48	0.95
Milwaukee, Wis.......	16.20	14.08	0.75				

* Natural gas.
† Manufactured and natural gas.

SECTION XII.—FINANCE

TABLE 45.—WORLD. MONETARY UNIT AND MONEY PER CAPITA, DEC. 31, 1919

Source: C.

Continent and Country.	A. Monetary Unit.	B. United States Equivalent at Par.	C. Gold and Silver per Capita	D. Paper Money per Capita	E. Gold and Silver per One Dollar of Paper
AFRICA:		$	$	$	
Belgian Kongo	Franc	0.193	0.33	0.19	1.74
Brit. Somaliland	Rupee	0.3244	2.32	0.24	9.66
Egypt	Pound	4.9431	2.92	26.92	0.11
Gold Coast	Pound	4.8665	....	12.85	0.00
Nigeria	Pound	4.8665	1.71	0.73	2.34
Nyasaland	Pound	4.8665	2.26	....	10.00†
Sierra Leone	Pound	4.8665	....	0.86	0.00
South Africa	Pound	4.8665	6.51	6.18	1.05
Tunis	Franc	0.193	5.99	21.35	0.28
ASIA:					
British India	Rupee	0.3244	0.91	2.23	0.41
Ceylon	Rupee	0.3244	1.98	4.21	0.47
China	Dollar	*	0.12	....	10.00†
Cyprus Island	Pound	4.8665	6.84	11.98	0.57
Dutch E Indies	Guilder	0.402	1.44	....	10.00†
Japan, Chosen and Taiwan	Yen	0.4985	7.75	11.89	0.65
Philippine Is.	Peso	0.50	1.86	5.91	0.31
Siam	Tical	0.3709	0.27	9.29	0.03
Straits Settlements	Dollar	0.5678	11.18	157.79	0.07
AUSTRALASIA:					
Australia	Pound	4.8665	44.47	55 51	0.80
New Zealand	Pound	4.8665	32.98	30.43	1.08
EUROPE:					
Austria-Hungary	Krone	0.2026	1.08	168.31	0.01
Belgium	Franc	0.193	7.39	120.59	0.06
Bulgaria	Lev	0.193	1.90	99.54	0.02
Czecho-Slovakia	Crown	0.026	2.00	70.12	0.03
Denmark	Krone	0.268	64.67	146.06	0.44
Finland	Markka	0.193	6.08	93.38	0.07
France	Franc	0.193	18.80	181.21	0.10
Germany	Mark	0.2382	3.85	173.80	0.02
Gibraltar	Pound	4.8665	20.95	48.38	.043
Great Britain	Pound	4.8665	16.88	52.88	0.32
EUROPE—*Cont.*		$	$	$	
Greece	Drachma	0.193	....	56.11	0.00
Italy	Lira	0.193	6.38	97.51	0.07
Jugoslavia	Dinar	0.193	2.79	73.31	0.04
Netherlands	Guilder	0.402	45.14	60.03	0.75
Norway	Krone	0.268	15.04	46.22	0.36
Poland	Mark	0.2382	....	104.55	0.00
Portugal	Escudo	1.0805	3.17	43.21	0.07
Rumania	Leu	0.193	0.05	110.91	0.00
Russia	Ruble	0.5146	1.27	....	10.00†
Spain	Pesata	0.193	28.22	35.86	0.79
Sweden	Krona	0.268	15.15	34.53	0.44
Switzerland	Franc	0.193	26.55	58.63	0.45
Turkey	Piaster	0.044	....	32.91	0.00
NORTH AMERICA:					
Canada	Dollar	1.00	21.82	42.38	0.51
British Honduras	Dollar	1.00	4.66	7.07	0.61
Costa Rica	Colon	0.4653	3.23	29.09	0.11
Cuba	Peso	1.00	19.40	38.05	0.51
Dominican Rep.	Dollar	1.00	1.61	17.24	0.09
Haiti	Gourde	0.25	0.26	1.40	0.19
Honduras	Peso	*	0.31	1.02	0.31†
Mexico	Peso	0.4985	3.29	3.23	1.02
Nicaragua	Cordoba	1.00	0.31	4.91	0.06
Panama	Balboa	1.00	1.28	....	10.00†
Salvador	Colon	0.50	4.15	6.83	0.61
Trinidad	Pound	4.8665	2.31	14.62	0.16
United States	Dollar	1.00	30.03	40.42	0.74
SOUTH AMERICA:					
Argentina	Peso	0.9648	36.11	62.50	0.58
Brazil	Milreis	0.5462	1.06	20.66	0 05
Chile	Peso	0.365	6.81	....	10.00†
Colombia	Dollar	0.9733	2.50	2.59	0.97
Paraguay	Peso (Argentina)	0.9648	....	120.60	0.00
Peru	Libra	4.8665	5.63	4.28	1.32
Uruguay	Peso	1.0342	41.77	....	10.00†

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* Fluctuates with price of silver.

A gold standard prevails in all the countries in this table except Honduras and China where the standard is silver.

† Arbitrary figure in cases where there is no paper money.

TABLE 46.—UNITED STATES. FINANCIAL CONDITIONS

Sources: B, C, and D.

State.	A. Average Wages of Farm Laborers, 1919. Per Month.	B. Average Yearly Earnings of Wage Earners in Manufacturing. 1919.	C. Estimated Value of All Property per Capita. 1912.	D. Average Net Income per Family Paying Federal Income Tax. 1918.	E. Accident and Health Insurance Premiums Paid per Capita. 1919.	F. Per Cent of People Who Pay Federal Income Tax. 1918.
	$	$	$	$	$	
Alabama	36.50	917	1020	3120	0.30	1.7
Arizona	83.00	1318	2270	3040	0.24	4.1
Arkansas	45.60	946	1120	3700	0.23	1.2
California	91.20	1250	3300	3400	0.96	6.0
Colorado	81.00	1220	2800	2920	0.93	5.8
Connecticut	71.00	1110	1980	3420	0.64	6.3
Delaware	50.50	1280	1500	4720	0.32	4.6
Florida	45.00	905	1310	3330	0.38	2.0
Georgia	38.50	830	900	3800	0.45	1.4
Idaho	93.60	1330	1690	2900	0.49	4.5
Illinois	58.50	1230	2660	3430	0.79	5.7
Indiana	53.30	1140	1890	3110	0.31	3.6
Iowa	71.43	1020	3590	3500	0.70	4.9
Kansas	65.50	1200	2660	3380	0.60	3.7
Kentucky	46.00	970	980	3530	1.03	2.0
Louisiana	43.10	960	1260	4100	0.30	1.9
Maine	70.00	1060	1420	3370	0.66	3.3
Maryland	49.00	1050	1650	3480	0.62	6.0
Massachusetts	71.00	1130	1810	4140	0.75	5.4
Michigan	60.00	1360	1880	3070	0.46	3.7
Minnesota	75.00	1100	2580	3440	0.60	3.5
Mississippi	38.00	895	1590	3520	0.17	1.1
Missouri	50.90	1010	1750	3690	0.40	3.3
Montana	89.00	1440	2950	2610	0.52	6.3
Nebraska	77.50	1260	3120	3190	1.78	7.4
Nevada	93.00	1390	5060	3520	0.97	9.2
New Hampshire	69.70	955	1500	3280	0.55	3.9
New Jersey	67.00	1180	2140	3500	0.47	5.9
New Mexico	59.20	1160	1450	2800	0.27	3.6
New York	62.50	1200	2690	4870	0.71	5.4
North Carolina	45.00	805	790	4130	0.19	0.9
North Dakota	79.30	1210	3340	3190	0.67	4.5
Ohio	56.20	1295	1820	3240	0.83	5.3
Oklahoma	60.60	1190	2490	3500	0.40	2.3
Oregon	87.00	1385	2680	3230	0.53	4.4
Pennsylvania	59.00	1240	1950	3220	0.52	5.9
Rhode Island	73.00	985	1710	3940	0.54	5.5
South Carolina	38.40	790	870	3650	0.23	1.2
South Dakota	88.00	1240	2250	3330	0.88	7.1
Tennessee	41.40	855	860	3640	0.34	1.6
Texas	55.20	1080	1680	3430	0.23	2.5
Utah	92.00	1140	2010	2830	0.69	4.1
Vermont	65.00	1020	1480	3420	0.51	2.8
Virginia	45.00	1010	1090	3380	0.36	2.2
Washington	91.00	1470	2520	2800	0.81	7.0
West Virginia	58.00	1225	1810	3200	0.70	3.3
Wisconsin	69.00	1095	1870	3070	0.41	3.6
Wyoming	86.10	1680	2240	3380	0.74	4.0

SECTION XIII.—EDUCATION

TABLE 47.—UNITED STATES. ILLITERACY AND EDUCATION, 1920

Source: B. Among Persons Over 10 Years of Age

State.	A. Per Cent Illiterate Among All Inhabitants Over 10 Years.	B. Per Cent Illiterate Among Native Whites of Native Parentage Over 10 Years.	C. Per Cent Illiterate Among Native Whites of Foreign or Mixed Parentage. Over 10 Years.	D. Per Cent Illiterate Among Foreign born Whites Over 10 Years.	E. Per Cent Illiterate Among Colored Persons Over 10 Years.	F. Per Cent Illiterate Among All Classes Over 10 Years.	G.	H. Percentage of Children 7–13 Years of Age in School.
						Urban.	Rural.	
Alabama	16.1	6.4	1.7	10.9	31.3	10.4	17.8	80.0
Arizona	15.3	1.3	4.6	27.5	4.6	6.5	20.4	78.8
Arkansas	9.4	4.6	2.0	8.3	21.8	4.9	10.3	82.0
California	3.3	0.4	0.5	10.5	4.7	2.4	5.4	93.7
Colorado	3.2	1.7	0.6	12.4	6.2	2.3	4.2	93.9
Connecticut	6.2	0.4	0.4	17.0	6.2	6.6	5.3	94.7
Delaware	5.9	2.0	0.6	17.3	19.1	5.7	6.1	95.2
Florida	9.6	3.1	1.1	6.3	21.5	5.4	12.2	83.2
Georgia	15.3	5.5	1.1	5.4	29.1	9.5	17.5	79.1
Idaho	1.5	0.3	0.3	6.5	5.4	1.4	1.5	95.5
Illinois	3.4	1.1	0.4	11.0	6.7	3.9	2.2	94.7
Indiana	2.2	1.4	1.0	11.8	9.5	2.6	1.8	94.9
Iowa	1.1	0.5	0.4	4.9	8.1	1.4	0.9	95.0
Kansas	1.6	0.6	0.5	10.5	8.8	2.0	1.4	94.5
Kentucky	8.4	7.3	1.3	7.3	21.0	5.1	9.8	88.5
Louisiana	21.9	11.4	3.5	21.9	38.5	9.1	29.6	75.9
Maine	3.3	1.3	2.9	11.1	5.9	3.5	3.1	94.2
Maryland	5.6	2.0	0.9	13.4	18.2	4.4	7.4	92.6
Massachusetts	4.7	0.3	0.5	12.8	6.8	4.8	3.0	96.1
Michigan	3.0	0.6	0.7	9.9	4.2	3.4	2.5	94.9
Minnesota	1.8	0.4	0.5	5.4	3.1	1.9	1.8	93.9
Mississippi	17.2	3.6	2.3	13.3	29.3	1.3	18.2	80.1
Missouri	3.0	2.2	0.9	9.6	12.1	2.6	3.5	93.4
Montana	2.3	0.3	0.3	5.6	6.0	1.6	2.6	92.8
Nebraska	1.4	0.4	0.4	6.4	4.8	2.0	1.0	93.9
Nevada	5.9	0.4	0.2	8.5	5.1	1.8	7.0	90.5
New Hampshire	4.4	0.6	1.1	15.4	6.7	5.3	2.8	93.4
New Jersey	5.1	0.7	0.4	15.3	6.1	5.3	4.6	94.9
New Mexico	15.6	11.9	8.2	27.1	4.3	7.1	17.6	87.4
New York	5.1	0.6	0.5	14.2	2.9	5.5	2.9	93.9
North Carolina	13.1	8.2	1.9	6.8	24.5	9.3	14.1	87.0
North Dakota	2.1	0.3	0.5	5.6	4.0	1.5	2.2	92.1
Ohio	2.8	1.0	0.6	12.6	8.1	3.2	2.2	96.0
Oklahoma	3.8	2.4	1.2	14.0	12.4	1.9	4.5	85.8
Oregon	1.5	0.4	0.3	5.1	4.7	1.5	1.4	94.7
Pennsylvania	4.6	0.8	0.6	18.9	6.1	4.6	4.6	94.5
Rhode Island	6.5	0.5	0.9	16.5	10.2	6.5	5.7	95.6
South Carolina	18.1	6.6	1.0	6.2	29.3	10.3	20.0	87.1
South Dakota	1.7	0.3	0.5	4.7	5.2	1.1	1.8	93.5
Tennessee	10.3	7.4	1.5	8.3	22.4	7.0	11.6	85.3
Texas	8.3	2.2	9.4	33.8	17.8	6.5	9.3	83.7
Utah	1.9	0.3	0.3	6.3	4.6	1.3	2.5	95.5
Vermont	3.0	1.1	2.8	11.3	6.2	3.9	2.6	93.9
Virginia	11.2	6.1	1.0	7.1	23.5	7.1	13.0	84.8
Washington	1.7	0.3	0.3	4.7	4.0	1.5	2.0	94.7
West Virginia	6.4	4.8	1.5	24.0	15.3	3.2	7.6	89.1
Wisconsin	2.4	0.5	0.8	8.4	4.1	2.6	2.3	94.5
Wyoming	2.1	0.4	0.3	9.0	5.3	2.1	2.1	92.8

SECTION XIV.—HEALTH

TABLE 48.—UNITED STATES. DEATH RATE AND VITAL INDEX

Source: H.

State.	A. Urban Death Rate. 1916.	B. Rural Death Rate, 1916.	C. Per Cent by which Urban Exceeds Rural.	D. Vital * Index Native-born Whites, 1917.	E. Vital * Index Foreign-born Whites, 1917.	F. Vital * Index Colored People, 1917.
California	13.5	13.6	−1	....	....	....
Colorado	11.8	9.4	26	....	....	....
Connecticut	16.7	15.3	9	86	323	82
Indiana	15.0	12.8	17	163	122	68
Kansas	13.2	10.3	18	207	69	72
Kentucky	16.0	11.9	34	222	30	76
Maine	18.1	15.0	20	106	167	35
Maryland	17.9	15.2	18	155	132	103
Massachusetts	15.1	15.5	−3	89	240	113
Michigan	17.1	13.7	25	159	184	75
Minnesota	12.1	9.9	22	242	111	66
Missouri	15.4	14.4	7	....	....	....
Montana	17.1	11.1	54	....	....	....
New Hampshire	16.3	16.0	2	80	195	92
New Jersey	14.7	15.4	−5	....	....	....
New York	14.5	15.7	−7	99	229	93
North Carolina	19.0	12.6	....	255	106	173
Ohio	15.5	13.4	16	147	182	67
Pennsylvania	15.9	13.4	19	131	276	75
Rhode Island	15.8	13.8	14	80	235	92
South Carolina	24.7	12.9		....	....	....
Utah	11.3	9.9	14	339	95	82
Vermont	17.4	15.4	13	114	137	117
Virginia	18.7	13.6	....	233	145	139
Washington	7.2	8.2	−12	287	120	59
Wisconsin	13.2	11.1	19	232	90	60

* The vital index is the number of births per 100 deaths.

TABLE 49.—UNITED STATES. DEATH RATES IN CITIES

Source: B.

City.	A. Death Rate per 1000 Population, All Causes. Average 1915–1919.	B. Colored, Percentage of Total Population. 1910.	C. White, Death Rate per 1000 Population. 1916.	D. Colored Death Rate per 1000 Population. 1916.	E. Percentage by which Colored Death Rate Exceeds White.
Birmingham, Ala	19.6	39.4	10.0	20.9	109
Los Angeles, Calif	13.9	4.3	12.0	19.9	66
Oakland, Calif	12.3	....	....	....	....
San Francisco, Calif	16.3	4.0	15.1	24.8	71
Denver, Colo	15.1	....	....	....	....
Bridgeport, Conn	17.2	....	....	....	....
New Haven, Conn	16.7	....	....	....	....
Washington, D. C	17.4	28.7	15.0	25.4	69
Atlanta, Ga	16.6	33.6	11.4	23.9	110
Chicago, Ill	14.6	2.1	14.3	24.0	68
Indianapolis, Ind	15.2	9.4	14.6	25.7	76
Louisville, Ky	18.4	18.1	13.1	23.9	82
New Orleans, La	21.0	26.4	14.3	30.0	110
Baltimore, Md	18.2	15.2	15.9	30.7	93
Boston, Mass	18.2	2.2	16.6	28.4	71
Cambridge, Mass	15.4	....	....	...	....
Fall River, Mass	18.1	....	....	....	....
Lowell, Mass	17.9	....	....	....	....
Worcester, Mass	17.0	....	....	....	....
Detroit, Mich	13.1	....	....	....	....
Grand Rapids, Mich	12.7	....	....	....	....
Minneapolis, Minn	12.7	....	....	....	....
St. Paul, Minn	12.7	....	....	....	...
Kansas City, Mo	16.5	9.5	13.3	26.5	99
St. Louis, Mo	15.2	6.5	14.1	26.4	87
Omaha, Nebr	13.7	....	....	....	....
Jersey City, N. J	16.4	....	....	....	....
Newark, N. J	15.5	....	....	....	....
Paterson, N. J	15.4	....	....	....	....
Albany, N. Y	19.2	....	....	....	....
Buffalo, N. Y	16.3	....	....	....	....
New York, N. Y	15.0	2.0	13.7	23.1	69
Rochester, N. Y	14.6	....	....	....	....
Syracuse, N. Y	15.3	....	....	....	....
Cincinnati, Ohio	17.6	5.4	15.5	32.0	106
Cleveland, Ohio	14.3	....	....	....	....
Columbus, Ohio	15.4	7.1	15.0	22.2	48
Dayton, Ohio	13.9	....	....	....	....
Toledo, Ohio	15.4	....	....	....	....
Portland, Ore	11.5	....	....	....	....
Philadelphia, Pa	17.4	5.5	15.7	24.0	53
Pittsburgh, Pa	19.0	4.9	17.0	24.8	46
Scranton, Pa	16.9	....	....	....	....
Providence, R. I	17.5	....	....	....	....
Memphis, Tenn	21.5	40.1	13.9*	29.9*	115
Nashville, Tenn	19.4	33.1	14.0*	24.4*	75
Richmond, Va	18.7	36.6	16.2	26.1	61
Seattle, Wash	10.1	....	....	....	....
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* 1915.

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